

BULLETIN OF MISCELLANEOUS INFORMATION No. 5 1932 ROYAL BOTANIC GARDENS, KEW

XXVIII.—CONTRIBUTIONS TO THE FLORA OF TROPICAL AMERICA: XII.* N. Y. SANDWICH.

NEW AND NOTEWORTHY SPECIES FROM BRITISH GUIANA, MAINLY
COLLECTED BY THE OXFORD UNIVERSITY EXPEDITION, 1929
(CONTINUED).

BURSERACEAE.

Tetragastris phanerosepala *Sandwich*, sp. nov.; *T. balsamiferae* (Sw.) Kze. affinis, bracteolis multo majoribus, calyce majore extra puberulo vel subtomentello, lobis perconspicuis, antheris extrorse distincte puberulis nec glabris, ovario et stylo distincto manifeste longiuscule piloso nec glabro differt.

Arbor ramulis summis minute pubescentibus. *Folia* imparipinnata, maxima, usque circiter 45 cm. longa, omnino glabra, petiolo rhachique purpurascente striato angulato 1.5–2.5 mm. lato; petiolus 8–10 cm. longus; internodia rhacheos 4–6 cm. longa, internodium terminale 2.5–3 cm. longum; petioluli canaliculati, 3–5 mm. longi; foliola 4–5-juga, opposita, oblonga, ima nonnunquam ovato-oblonga, terminale nonnunquam obovato-oblongum, apice conspicue abrupte acuminata vel cuspidata, basi cuneata acuta obliqua in petiolulum decurrentia, 8–15.5 cm. longa, 3–5.3 cm. lata, firme chartacea, utrinque nitidula, nervis primariis utroque costae latere 12–16 forma atque reticulatione eis *T. balsamiferae* simillima. *Inflorescentia* paniculata, furfuraceo-puberula, usque 14 cm. longa; rami primarii inferiores 2–4 cm. longi, compositi, summi brevissimi, triflori; pedicelli brevissimi, tomentelli, 1–2 mm. longi; bracteolae late ovatae, 2.5 mm. longae, 2.2–2.5 mm. latae, extra tomentellae, intus puberulae. *Flores* maturi fere 5 mm. longi. *Calyx* cupularis, extra furfuraceo-puberulus vel subtomentellus, intus glaber; tubus vix 2 mm. longus, apice 4.5 mm. latus; lobi conspicui, late triangulares, 1–1.5 mm. longi, 2–2.75 mm. lati. *Corolla* campanulato-cylindrica, vix 4.5 mm. longa, apice 4 mm. lata, circiter in medio in 4–5 lobos 2 mm. longos vix 2 mm. latos divisa, lobis marginibus apiculoque inflexis, extra tomentella intus basi excepta puberula atque minute cinereo-pulverulenta. *Stamina* 8–10, filamentis glabris 0.4–0.6 mm. longis; antherae 1.2 mm. longae, extrorse minute sed distincte puberulae. *Discus* glaber, 1 mm. altus, margine undulato-sinuato. *Ovarium* quinqueloculare, subglobosum, vix

*Continued from *K.B.* 1932, 187.

1.2 mm. longum, circiter 2 mm. diametro, sparse longiuscule pilosum, in stylum pilosum cum stigmate 5-lobulato ad 1 mm. longum transiens. *Fructus* non visus.

BRITISH GUIANA. Demerara River, May 1889, *Jenman* 4928.

This very distinct species was identified long ago as "*Hedwigia* sp. nov.?" by the late Mr. W. B. Hemsley.

ANACARDIACEAE.

Thyrsodium dasytrichum *Sandwith*, sp. nov.; *T. Schomburgkiano* (Bth.) Engl. et *T. giganteo* (Engl.) Engl. affinis, foliis utrinque pilis longioribus (fere 1 mm. longis) crispulis ubique praecipue subtus dense molliter vestitis, praeterea floribus femineis quam eis *T. Schomburgkiani* majoribus, laciniis calycinis petalisque longioribus differt.

Arbor parva usque mediocris, lactescens; ramuli hornotini teretes, validi, 6-8 mm. diametro, dense fulvo-tomentosi. *Folia* imparipinnata, gigantea, petiolo internodiis rhacheos petiolulisque dense crispule fulvo-tomentosis; petiolus 9-12 cm. longus, 3-4 mm. diametro; internodia rhacheos 4-8 cm. longa; petioluli 3-7 mm. longi; foliola 2-4-jugata, opposita, vel fere opposita, ima ovato-oblonga, cetera oblonga, apice abrupte conspicue cuspidata, basi rotundata obtusa obliqua, 12-22 cm. longa, 6-9 cm. lata, subcoriacea, supra pilis pallide fulvis crispulis satis longis costa nervisque dense mesophyllo sparsius sed regulariter adpresse induta, subtus pilis similibus densis passim mollia velutina, nervis primariis utrinque conspicuis utroque costae latere circiter 14-20, reticulatione supra impressa obscura subtus manifesta. *Inflorescentia feminea* tantum visa; panícula longissima, usque 45 cm. longa, ubique pilis pullo-purpurascens demum fulvis dense sublanato-tomentosa; rhachis valida, prope medium 5-7 mm. diametro; rami primarii satis pauci, adscendentes, inferiores 7-12.5 cm. longi, compressi, angulato-sulcati, parte nuda saepius 3-5 cm. longa; ramuli floriferi 1.5-2.5 cm. longi, simplices, vel basi compositi, congestiflori; pedicelli 2-3 mm. longi; bracteolae lanceolatae, circiter 3 mm. longae, 1 mm. latae (bracteae longiores latioresque). *Flores* campanulati, 7 mm. longi, statu applanato apice 5-6 mm. lati. *Calycis* tubus 2.5 mm. longus, 5 mm. latus, extra dense purpureo-tomentosus, intus glaber; lobi triangulari-lanceolati, acuti, 3.5 mm. longi, igitur tubum superantes, basi 1.8-2.2 mm. lati, utrinque tomentosi. *Petala* anguste lanceolato-oblonga, obtusa, 4 mm. longa, igitur calycem superantia, 1.5 mm. lata, utrinque tomentosa, calyce pallidiora. *Staminodia* filamentis circiter 1.1 mm. longis, antheris rudimentariis 0.5 mm. longis. *Ovarium* dense ferrugineo-villosum, globosum, 2 mm. longum, 2.5-3 mm. diametro; stylus villosus, cum stigmate 2.5-3 mm. longus. *Fructus* non visus.

BRITISH GUIANA. Cuyuni River; near Upper Camaria, Feb. 1931, *J. R. Lockie* in *Forestry Department* record no. 2019. "A small tree, 60 ft. high, 9 in. diam., in greenheart forest on hill on brown

sand. Latex white, abundant in leaves, twigs and flowers, but not in main stem. Flowers odourless."

Vernacular name (Arawak), Uluballi.

This is the first genuine record of the occurrence of this genus in British Guiana, since *Robert Schomburgk* 892 was almost certainly collected on the Rio Negro, where *T. Schomburgkianum* was later gathered by Spruce. In Robert Schomburgk's manuscript notes preserved at Kew numbers 891 and 893 are definitely stated to have been collected on the Rio Negro.

MYRTACEAE.

Eugenia essequiboënsis *Sandwith*, sp. nov.; *E. seriato-ramosae* Kiaersk. ut videtur affinis, pedunculis saepe bifloris, bracteolis subulatis, nervis foliorum primariis paucioribus differt.

Arbor excelsa, circiter 30 m. alta, cortice rubro-brunneo; ramuli novelli ferrugineo-tomentosi. *Folia* elliptica, ovato-elliptica vel oblanceolata, apice sensim breviter acuminata, basi attenuata cuneata, 2-9.5 cm. longa, 1-3.5 cm. lata, rigide chartacea vel subcoriacea, utrinque satis nitida, viridia, pagina inferiore carnosula rugulosa quam superiore pallidior, novella pubescentia, adulta utrinque glaberrima, glanduloso-punctata, novella saepe fere evenia, adulta nervis primariis utroque costae latere vulgo 12-14 patulis parallelis plus minusve rectis tum in nervum marginalem a margine 2-3.5 mm. distantem anastomosantibus, cum costa venulisque supra plus minusve impressis subtus laxè haud conspicue reticulatis; petiolus primo ferrugineo-pubescent, adultus glaber, 4-12 mm. longus. *Inflorescentiae* axillares, solitariae, pedunculis unifloris vel bifloris, nonnunquam in axillis foliorum, saepius basi ramulorum brevium in axillis cataphyllorum ita dispositae ut racemum simulent; pedunculi pedicellique ferrugineo-tomentosi, 4-10 mm. longi; bracteolae sub floribus ferrugineo-tomentosae, subulatae, 1.5 mm. longae. *Hypanthium* turbinato-campanulatum, circiter 2 mm. longum atque latum. *Calycis* lobi 4, ovati, obtusi, 3 mm. longi, 3 mm. lati, extra ferrugineo-pubescentes, intus cinerei sericeo-pilosi. *Petala* 4, pallide albo-viridia, suborbicularia, venosa, ciliata, ceterum glabra, 4.5 mm. longa, ad 5 mm. lata. *Stamina* glabra, 7 mm. longa; discus hic illic pilosulus. *Stylus* glaber, 6-7 mm. longus. *Fructus* pyriformis, nigrescens, pubescens, 1.1-1.5 cm. longus, 4-8 mm. latus, apice lobis calycinis coronatus.

BRITISH GUIANA. Moraballi Creek, Essequibo River, Oct. 21st, 1929, *Sandwith* 500. Tall tree, 103 ft. high, 17 in. diam. in mixed forest. Bark reddish-brown and lined, like that of *Asipoko* (*Pouteria* spp.). Petals and stamens pale whitish-green.

Duplicates are distributed to the following herbaria: Georgetown (Forestry Department), New York, Rio de Janeiro, Utrecht, Berlin, Paris, Washington and Stockholm.

Eugenia Arawakorum *Sandwith*, sp. nov.; ex affinitate, ut videtur, *E. Ferreiraeanae* Berg., foliis longioribus magis obovatis

basi acutis subtus reticulatis, indumento inflorescentiae cinereo pubescente vel sericeo nec rufo-tomentoso statim distinguenda.

Arbor, satis excelsa; ramuli annotini cinerei glabri, hornotini cinnamomei pubescentes. *Folia* oblanceolata, obovato-oblonga usque obovato-elliptica, apice abrupte 2-10 mm. acuminata vel cuspidata, basi attenuata cuneata acuta, 4-15.5 cm. longa, 1.7-6.2 cm. lata, rigide chartacea usque subcoriacea, supra nitida siccitate nigrescentia juventute pubescentia demum glabra, subtus subopaca pallidiora olivacea vel siccitate purpurascentia sparse pubescentia punctato-glandulosa, nervis primariis utroque costae latere numerosis circiter 20-25 patulis parallelis subrectis in nervum marginalem a margine ad 1.5 mm. tantum distantem anastomosantibus supra impressis inconspicuis subtus cum costa venulisque elevatis conspicuis laxe reticulatis; petiolus resinoso-corrugatus, plus minusve pubescens, 0.6-1.3 cm. longus. *Inflorescentiae* axillares, saepius nodis defoliatis visae, 1-3-nae, brevissime ad 1 cm. umbellato-racemosae, multiflorae, rhachi cicatricibus pedicellorum bracteisque obiecta; bractee ovatae, vix ad 1 mm. longae; pedicelli brunneo-glandulosi atque cinereo-pubescentes, 3-8 mm. longi; bracteolae sub flore positae, indumento pedicelli indutae, ad 1.5 mm. longae atque 1 mm. latae. *Hypanthium* subgloboso-campanulatum, ad 2.5 mm. longum atque diametro, extra dense cinereo-sericeum. *Calycis* lobi 4, late rotundato-ovati, obtusi, circiter 2.25 mm. longi, ad 2.75 mm. lati, extra plus minusve pubescentes atque ciliati, intus glabri. *Petala* alba, de exemplis siccis delapsa. *Stamina* glabra; discus pilosulus. *Stylus* glaber, circiter ad 5 mm. longus. *Fructus* non visus.

BRITISH GUIANA. Moraballi Creek, Essequibo River, Oct. 16th, 1929, *Sandwith* 462. A tall tree in mixed forest. Petals white.

Vernacular name (Arawak), Baniaballi; but this is applied to other Myrtaceae.

Calycorectes Bergii *Sandwith*, nom. nov.—*C. latifolius* Berg in Linnaea, xxx. 701 (1860), quoad descr., non *Eugenia latifolia* Aubl. Hist. Pl. Guianae, 502, t. 199 (1775).

BRITISH GUIANA. Moraballi Creek, Essequibo River, Nov. 5th, 1929, *Sandwith* 558: small tree, 43 ft. high, 5 in. diam., in morabukea forest; flowers large, snow-white.

FRENCH GUIANA. Karouany, 1857, *Sagot* 272. Godebert, Nov. 1919, *Wachenheim* 32. Maroni River, 1862, *Mélinon*. The last two collections were distributed from Paris under the name *C. grandifolius* Berg. which, to judge from the description, is at once distinguished by the venation of the leaves.

The above material agrees very well with Berg's description of his *C. latifolius* which he based on *Eugenia latifolia* Aubl. Aublet's species is, however, a very different plant, as is proved by his specimens in Herb. Mus. Brit., which agree well with his figures and description. It suggests a true *Eugenia* rather than a *Calycorectes*, and differs from *C. latifolius* Berg in the shape and venation

of the leaves, the thin black glabrescent pedicels and hypanthium, and the very small sepals which are only 2 mm. long. By the International Rules of nomenclature, the combination *C. latifolius* Berg must be applied to Aublet's species; the above name is accordingly proposed for Berg's plant.

LECYTHIDACEAE.

Lecythis Davisii *Sandwith*, sp. nov. ; e grege *L. PohlII* Berg, *L. biserratae* Miers, *L. crassinodae* Miers, *L. Coxianae* Miers, *L. tuberculatae* Miers, pedicellis crassis, bracteolis satis magnis longe persistentibus distincta ; a *L. crassinoda* Miers, cuius flores nondum sunt reperti, foliis plerumque minoribus, fortius reticulatis, marginibus profundius serrulatis, petiolis brevioribus differt.

Arbor excelsa, circiter 30 m. alta ; ramuli summi annotini valde ramulosi, teretes, corrugato-striati, lenticellis crebris aurantiacis praediti ; hornotini crebri, breves, angulati, brunnei, minute hirtelli, internodiis vulgo 0.3-1.5 cm. longis. *Folia* oblongo-lanceolata vel minora ovata, apice conspicue acuminata acumine 3-8 mm. longo, basi saepius obtusa sed in petiolum attenuata decurrentia, parva, 2.5-9 cm. longa, ad 3.8 cm. lata, chartacea, utrinque nitida, glabra, concoloria, vel siccitate supra nigrescentia, subtus lepidoto-glandulosa, margine conspicue serrulata serrulis 1-1.75 mm. distantibus, utrinque fortiter reticulata, nervis primariis utroque costae latere circiter 14 vulgo 2.5-7 mm. a margine anastomosantibus ; petiolus alatus, minute hirtellus, 2.5-6 mm. longus, cum alis ad 1.5 mm. latus. *Inflorescentiae* plurimae, simpliciter racemosae, multiflorae, saepius in axillis denudatis ramulorum annotinorum solitariae vel binae, ad 7 cm. longae ; rhachis crassa, hirtella, corrugato-striata atque lenticellata, brunnea ; pedicelli cum hypanthio minute hirtelli, crassissimi atque sursum ampliati, 5-8 mm. longi, prope basim articulati, ibi circiter 2 mm. lati, demum ad 6 mm. ampliati ; bracteolae articulo affixae conspicuae, persistentes, rotundato-ovatae, minute hirtellae, 1.5-2 mm. longae atque latae. *Flores* pulcherrimi, mediocres, 2.5-3.5 cm. diametro. *Sepala* suborbicularia, ad 3.5 mm. longa, 3-4 mm. lata, ciliolata, ceterum extra glabrescentia vel parce minute hirtella. *Petala* dimidio inferiore albo-flavida, superiore purpurea, glabra, obovata, inaequalia, majora ad 2.1 cm. longa, ad 1.4 cm. lata. *Androphorum* glabrum, explanatum circiter 3.5 cm. longum, super annulo ad 1.3 cm. latum, galea intus staminodiis dense echinata ad 1.6 cm. diametro. *Stamina* aurea, circa annulum numerosissima, filamentis apice ampliatis ad 1.5 mm. longis, antheris globosis vix 0.5 mm. diametro. *Staminodia* aurea, 2.5-3.5 mm. longa, summa ananthera, cetera antherifera. *Ovarium* vertice siccitate nigro striatulo glabro 3 mm. diametro, disco ochraceo addito ad 6 mm. diametro, quadriloculare, ovulis numerosis ; stylus crasse cylindrico-conicus, brevis, ad 1.5 mm. longus. *Fructus* verosimiliter giganteus.

BRITISH GUIANA. Moraballi Creek, Essequibo River, Sept. 7th, 1929, *Sandwith* 188 (type) : large tree in mixed forest, 109 ft. high,

2 ft. diam., 40 ft. to the first fork, trunk shallowly fluted, not buttressed; flowers very handsome; petals cream in lower half, purple in upper half; stamens and staminodes gold. Bartica Grove, Aug. 1884, *Jenman* 2157. "Guyane anglaise, no. 90, donné par M. H. Stone" (Herb. Mus. Paris).

Vernacular names (Arawak): Wadaduri; Monkey Pot.

It will be noticed that the vernacular names are the same as those recorded by Appun for *L. crassinoda* Miers, which was also collected in British Guiana. This species was described from leaves and fruit only, and the leaves, as pointed out above, differ widely from those of *L. Davisii*, although it is possible that future collections may show that such leaves may be produced on trees of the latter.

Forestry Department no. 56A, from the Pomeroon River, July 1918, coll. *Hohenkerk*, is another Wadaduri, with leaves very similar to those of *L. Davisii*, up to 10 cm. long, and up to 4.5 cm. wide. There are no flowers or calyces on the specimen, but a fruit was forwarded which was collected from the same tree, and which is extremely distinct from that of *L. crassinoda* and *L. tumefacta*. This fruit may be described as follows: pyxidium sublaeve, scrobiculatum, rhomboideo-turbinatum, 13.5 cm. altum, 14 cm. diametro, "zona calyculari" supra medium (8.5 cm. e basi) obscure sinuata obsoletissime lobata, "vitta interzonalis" angulo circiter 40° adscendente 4-5 cm. longa, operculo extra convexo vix 7 cm. diametro vix 2 cm. alto apice umbonato, intus ("columella") late conico fibroso ad 3 cm. longo; semina anguste ellipsoidea, 2.5-3.3 cm. longa, vulgo 1 cm. diametro, brunnea, rugulosa, costata, costis pallidioribus, funiculis membranaceis albis 2 cm. vel ultra longis.

Eschweilera (§ Chytroma) decolorans *Sandwith*, sp. nov.; ob calycem corollamque magnam, pedicellos insigne articulatos, petala nivea post florem lapsum contusa colore viridi-caeruleo insigni tincta valde distincta; faciem *Lecythidis grandiflorae* Aubl. atque *L. persistentis* Sagot praebens, ab illa foliis minoribus angustioribus minus crassis minus obsolete crenulatis, petiolis brevioribus minus crassis, racemi rhachi minus crassa, floribus minoribus differt; a *L. persistente* Sagot, quae pedicellos similiter articulatos exhibet, inter alia foliis haud coriaceis petiolis brevioribus, sepalis duplo majoribus differt.

Arbor mediocris usque excelsa, saepius 15-30 m. alta, ramulis summis novellis glabris siccitate nigrescentibus. *Folia* oblonga usque elliptica vel lanceolata, apice conspicue acute acuminata vel abrupte cuspidata, acumine 0.8-2 cm. longo, basi obtusa vel abrupte cuneata, 5-21.5 cm. longa, 1.8-8.3 cm. lata, chartacea, utrinque nitida, glabra, siccitate olivacea, margine obsolete sed distincte crenulato, utrinque intricatissime subaequaliter reticulata, nervis primariis utroque costae laterae 10-16 a margine satis longe (saepe 6-10 mm.) anastomosantibus; petiolus supra profunde canaliculatus, 0.3-1.2 cm. longus, raro ad 2 mm. (vulgo 1.75 mm.) crassus.

Inflorescentia vulgo simpliciter racemosa, 3-12 cm. longa, ad 12-flora; rhachis glabra, 1-2.5 mm. crassa, flexuosa, angulata; pedicelli glabri, 0.6-2.2 cm. longi, sub flore dilatati, ad 2.5 mm. crassi, infra medium vel basim versus conspicue crasse articulati, parte inferiore crassiore post florem lapsum persistente, parte superiore saepius nutante; bracteolae ex articulo orientes, magnae, oblongae, ad 9 mm. longae (saepe breviores), ad 3 mm. latae, mox caducae. *Alabastra* matura saepe ad 1.5 cm. diametro. *Flores* magni, circiter 6-7 cm. diametro. *Sepala* magna, late rotundato-ovata, obtusissima, glabra sed glanduloso-punctulata, margine fimbriatula, ad 1 cm. longa, ad 1 cm. lata. *Petala* inaequalia, late oblonga, 2.5-3.2 cm. longa, 1.7 usque fere 2.5 cm. lata, glabra, parce fimbriato-ciliolata, nivea sed mox contusione hic illic viridi-caerulea vel colore indici conspicue maculata. *Androphorum* luteum, glabrum, explanatum ad 5 cm. longum, super annulo circiter 1.5 cm. latum, tum in galeam incurvatam staminodiis dense echinatum 2 cm. diametro expansum. *Stamina* circa annulum et paullo supra valde numerosa; filamenta circiter 1.8 mm. longa, sub filo antherifero brevissimo ampliata; antherae 0.5 mm. diametro. *Staminodia* ad 7 mm. longa, basi saepius 2-3 mm. lata, vulgo subfalcata, acuta, ananthera. *Ovarium* semisuperum, vertice elevato rotundato corrugulato 5 mm. diametro, in stylum brevem conicum 2 mm. longum contractum, quadriloculare, ovulis in quoque loculo e basi erectis paucis ut videtur 4. *Fructus* non visus.

BRITISH GUIANA. Moraballi Creek, Essequibo River, Aug.-Oct. 1929, *Sandwith* 348 (type), 2, 414, 460: tree 50-115 ft. high, 4-24 in. diam., in mixed forest; petals pure white, always bruising a dark bluish-green; androphorum yellow. Yarikita River, Northwest District, April 1929, *Forestry Department* record no. 920. Near Bartica, Nov. 1886, *Jenman* 2474.

Vernacular name (Arawak), Smooth-leaved Kakaralli.

Eschweilera Wachenheimii (*R. Benoist*) *Sandwith*, comb. nov., descr. ampl.—*Lecythis Wachenheimii* R. Benoist in Bull. Mus. Hist. Nat. Paris, xxix. 594 (1923).

Arbor satis parva vel mediocris; ramuli summi tenues, graciles, novelli puberuli. *Folia* lanceolata, elliptica usque oblanceolata vel fere obovata, apice longe conspicue acute anguste acuminata vel cuspidata, acumine vulgo 1-2.5 cm. longo, basi attenuata acuta, 4-18 cm. longa, 1.3-5.7 cm. lata, tenuiter chartacea, glabra, nitidula, margine paullum revoluta obsolete crenulato, supra pallide olivacea intricatissime reticulata, subtus siccitate pallide grisea vel fere glaucescentia valde sed minus intricate reticulata, nervis lateralibus utroque costae latere 8-12 patuli-adscendentibus distantia conspicua (3-10 mm.) a margine anastomosantibus; petiolus glaber, corrugulatus, gracilis, supra canaliculatus, vulgo 4-8 mm. longus. *Inflorescentia* racemosa, simplex vel basi ramosa; racemi rigidi, multiflori atque densiflori nodis incrassatis, ad 6 cm. longi, 2-3 mm. crassi, dense puberuli. *Flores* subsessiles, 2.5 cm. diametro attingentes.

Calyx siccitate brunneus, crassus, puberulus atque verruculosus, limbo post anthesin cupulari 6–8 mm. diametro ; hypanthium 2 mm. longum, 3 mm. latum ; lobi late ovati vel semiorbiculares, rotundati, ciliolati, post anthesin suberecti, ad 1.75 mm. longi, ad 2.5 mm. lati. *Petala* albo-flavida, inaequalia (interiora majora), extra (praesertim exteriora) plus minusve minute cinereo-puberula, intus glabra, eciliata, 0.8–1.2 cm. longa, 7–9 mm. lata. *Androphorum* flavum, totum ad 2.5 cm. longum, basi ultra annulum 6 mm. latum, glabrum, galea 1 cm. longa 1.7 cm. lata, appendiculis anantheris lineari-falcatis ad 4.5 mm. longis oblecta. *Stamina* circa annulum numerosissima, filamentis 0.7 mm. longis ; majora etiam triente androphori inferiore filamentis ad 2.5 mm. longis reperiuntur. *Ovarium* semisuperum, biloculare, loculis pauciovulatis, demum post anthesin turbinatum circiter ad 7 mm. longum atque diametro ; stylus brevis, crassus, saepius subfalcatus, ad 2 mm. longus. *Fructus* non visus.

BRITISH GUIANA. Moraballi Creek, Essequibo River, Aug.-Sept., 1929, *Sandwith* 106, 169, 280 ; a tree of middle size or sometimes only 45–50 ft. high, in morabukea and mixed forest ; petals creamy-yellow ; androphorum darker yellow.

FRENCH GUIANA. Godebert and crique Sainte Marguerite, *Wachenheim* 283, 359 (typi in Herb. Mus. Paris). These specimens agree perfectly with the British Guiana material.

Vernacular name (Arawak), Fine-leaved Black Kakaralli.

Eschweilera grata *Sandwith*, sp. nov. ; *E. micranthae* Meirs forsan affinis, ob inflorescentias omnino glabras, rhachin pedicellosque graciles saepius flexuosos, flores parvos flavidos distinctissima.

Arbor mediocris, circiter 21 m. alta ; ramuli glabri, novelli siccitate olivaceo-nigrescentes, parce lenticellati, internodiis 0.8–3 cm. longis. *Folia* lanceolata usque elliptica, apice ad 1.2 cm. conspicue acute acuminata, basi cuneata, satis parva, 5–13.5 cm. longa, 1.2–5.2 cm. lata, rigide chartacea, integra, nitidula, concoloria, glabra, margine revoluta, utrinque praesertim supra reticulata, nervis primariis utroque costae latere 12–16 adscendentibus arcuatis vel subrectis 2–8 mm. a margine anastomosantibus ; petiolus glaber, gracilis, corrugulatus, 3–8 mm. longus, circiter 1.2 mm. crassus. *Inflorescentia* paniculata vel simpliciter racemosa, rhachi pedicellisque flavo-olivaceis omnino glaberrimis gracilibus atque saepius conspicue flexuosis, nodis incrassatis ; rami ad 10 cm. longi ; pedicelli 0.4–1.5 cm. longi, saepius vix 0.5 mm. crassi. *Alabastra* flava, globosa, 4–6 mm. diametro. *Flores* aperti parvi, ad 2.5 cm. diametro. *Sepala* ovata usque oblonga-ovata, obtusa, glabra sed parce inconspicue ciliolata, ad 2.5 mm. longa, ad 2 mm. lata. *Petala* laete flavida, inaequalia, late obovato-elliptica, 1.1–1.4 cm. longa, 8–10 mm. lata. *Androphorum* luteum, totum 2.2 cm. longum, super annulo 8 mm. latum, tum galea appendiculis anantheris linearibus ad 3.5 mm. longis dense echinata ad 1 cm. lata. *Stamina* lutea, filamentis 0.7 mm. longis, antheris globosis 0.3 mm.

diametro. *Ovarium* biloculare, vertice ad 2.5 mm. diametro, stylo conico brevissimo ad 0.7 mm. longo; ovula in quoque loculo pauca, ut videtur 2. *Fructus* non visus.

BRITISH GUIANA. Cuyuni River; in hilly mixed forest near the right bank below the Akaio Falls, Nov. 22nd, 1929, *Sandwith* 651. A middle-sized tree, about 70 ft. high, 8 in. diam. Inflorescence very pretty, with slender green to reddish pedicels, small yellow buds, small flowers up to 1 in. diam., with rich creamy-yellow petals, and a darker yellow androphorum.

Eschweilera simplex Miers in Trans. Linn. Soc. xxx. 264 (1874) is ***Cymbopetalum brasiliense*** (Vell.) Bth. (Annonaceae). This identification has been confirmed by Prof. R. E. Fries, who also examined the solitary type specimen (Cayenne, *Martin*) in Herb. Mus. Brit., see Acta Horti Bergiani, x. 186 (1931). Miers (l.c.) wrote "As there is only a single flower glued to the sheet, I could not ascertain its structure." But the androecium is visible and, added to the unusual facies, should have saved the author from this curious and unnecessary error.

Couratari pulchra *Sandwith*, sp. nov.; *Allantomae subramosae* Miers affinis, foliis simillimis, sed inflorescentiis laxis, pedicellis multo longioribus, lobis calycinis magis ovatis corollaque majoribus, petalis conspicue ciliatis, ovulis paullo angustius obovoideo-spathulatis differt.

Arbor excelsa, ad 45 m. alta, foliis fere omnibus simul deciduis, inflorescentiis roseis creberrimis per ramulos summos defoliatos gestis, insignis atque pulcherrima; ramuli corrugato-striati, juventute brevissime tomentelli, demum glabrati purpurascens lenticellati; ramuli summi laterales brevissimi, apice foliis binis terminati. *Folia* adulta oblonga usque obovato-oblonga, apice truncato-rotundata vel breviter late cuspidata, basi rotundata vel raro cuneata, 7-15 cm. longa, 4-7.8 cm. lata, coriacea, integra sed marginibus undulatis revolutis, supra glabrata vel pubescentia nitidula nervis costaque impressis sed conspicuis, subtus dense conspicue arachnoideo-stellato-pubescentia nervis costaque tomentellis, reticulata, nervis primariis utroque costae latere vulgo 18-22 basi folii excepta adscendentibus subrectis parallelis marginem versus anastomosantibus; petiolus dense minute tomentellus, profunde canaliculatus, 1-1.7 cm. longus. *Inflorescentiae* per totum verticem defoliatum creberrimae, paniculatae, pyramidales, saepius 10-20 cm. longae, ramis longis adscendentibus dense fusco-tomentellis laxe racemosis; pedicelli siccitate purpurei, dense tomentelli, graciles, flexuosi, 2-3.7 cm. longi. *Alabastra* purpurea, petalis basi viridescenti-pruinosis. *Calyx* hypanthio subgloboso-campanulato purpureo tomentello 2-3 mm. longo ad 3.5 mm. lato; lobi late ovati, purpurei, utrinque pubescentes, 2.5-3.5 mm. longi atque lati. *Petala* statu vivente pulcherrime rosea, spathulata; extimum cucullatum, siccitate apice excepto intense purpureum,

ciliatum, extra granuloso-tomentellum, intus parce pubescens, circiter 2.5 cm. longum, apice ad 1.2 cm. latum; interiora 5 magis plana, siccitate dimidio inferiore tantum colore purpureo suffusa, ciliata, extra farinaceo-pubescentia, intus fere glabra, 2.6-3 cm. longa, apice 1 cm. lata, basi 4-6 mm. lata. *Androphorum* statu vivente roseum margine purpurascens, circiter 3.3 cm. longum, basi circa annulum 1.2 cm. latum, satis parce pubescens, apice forma generis *Allantomae* a cl. Miers descripta, hic 1-1.3 cm. lata vel diametro. *Stamina* circa annulum ut videtur 15-25, filamentis 0.7 mm. longis, antheris globosis ad 0.6 mm. longis atque latis. *Ovarium* triloculare, vertice glabro, stylo umbonato 0.6 mm. alto, loculis pluriovulatis; ovula anguste obovoideo-spathulata. *Fructus* ignotus.

BRITISH GUIANA. Moraballi Creek, Essequibo River, August 26th, 1929, *Sandwith* 122 (type): a very large tree, 142 ft. high, in mixed forest; flowering without the leaves, the whole crown covered with inflorescences in rose-pink masses; buds purplish; androphorum with darker reddish-purple margin; a few mature leaves were collected when the tree was felled and, not long after, a collection was made of some fresh young leaves which had sprouted after the fall. *Ibid.*, Oct. 15th, 1929, *Sandwith* 459; mature leaves of a young, still sterile, tree 85 ft. high, 8 in. diam., in mixed forest, doubtfully referable to this species.

Vernacular name (Arawak), Wadara.

One of the largest and most beautiful trees in these forests, broadly buttressed for some distance from the ground. It is closely allied to *Allantoma subramosa* Miers of Cayenne, but is easily distinguished by the much finer laxer inflorescences, with longer pedicels and larger flowers, the larger more ovate (not semicircular) calyxlobes, and the conspicuously ciliate petals.

This species is placed in the genus *Couratari* in accordance with the views of Mr. P. J. Eyma, of Utrecht, who will shortly publish an account of the Lecythidaceae of Surinam, in which he will discuss the composite nature of Miers' genus *Allantoma*, and the interpretation of Aublet's genus *Couratari*. Mr. Eyma has done a great service to tropical American botany by elucidating these highly intricate problems, and the writer records his grateful thanks to him for enabling the treatment of the present species to fall into line with his conclusions. Meanwhile, a paper proposing a lectotype for *Allantoma* Miers has been prepared by Dr. T. A. Sprague.

APOCYNACEAE.

The following new species has been described by Dr. Robert E. Woodson, Jr., who kindly examined some of the material of this family which was collected by the Oxford Expedition:—

Odontadenia Sandwithiana Woodson in Ann. Missouri Bot. Gard. xviii. 547 (1931).

Moraballi Creek, Essequibo River, November 2nd, 1929, *Sandwith* 552: a bush-rope in wallaba forest on sandy ridge, only once found; buds yellowish-green; corolla hypocrateriform, limb white. Type in Kew Herb.; photograph and drawing in Herb. Missouri Bot. Gard.; duplicate without corollas in Herb. Jard. Bot. Rio de Janeiro.

NYCTAGINACEAE.

PISONIAE (§ EUPISONIA) GUIANENSES NOVAE.

Auctore A. Heimerl, Vienna.

Pisonia albiflora *Heimerl*, sp. nov.

Arbuscula (?), paulo ultra bimetralis. *Rami* graciliores, griseo-brunneoli, in summis internodiis pilis ferrugineis (partim etiam griseolis), brevibus, patulis, rigidulis subhirsuti, indumento dein plus minusve evanescente, gemmis dense ferrugineo-puberulis. *Folia* (minora subsessilia, latissime ovata, brevissime antice acuminata) pleraque spectabilia, petiolo 10–14 mm. longo, 1.5 mm. crasso, modice piloso suffulta, oblongo-elliptica, 13–15.2 cm. longa, 4.6–5 cm. lata, fere in dimidio latissima, basin versus vel cuneatim vel magis obtusatim angustata, antice breviter acuminata et producta, apice ipso paulo obtusiusculo, in sicco brunneola, concoloria, pergamacea, supra paululum nitentia et glabra, infra opaca et secus costam pilis (eisdem ut in petiolo) brunneolis, subsetulosis hirta, indumento costali versus laminae basin densiore, versus apicem sensim evanescente, costa validiuscula, nervis secundariis usque 15 utrinque, rectiusculis, sub angulo 70–80° abeuntibus, sparse tenuiterque ramificatis, nervatura utraque facie paulum prominula. *Inflorescentiae* ♀ pedunculo debili, plus minusve arcuato, 3.6–4.9 cm. longo, modice dense ferruginoso-piloso suffultae, corymbosae, 2.4–3.7 cm. latae, 1.4–2.3 cm. longae, plus minusve floribundae, minus densae, subglabrae, ramificationibus tenuibus, ramis primariis 4, subumbellatim ordinatis, plus minusve inaequilongis, usque 1.4 cm. longis, eodem modo iterum ramificatis, ramis secundariis apice vel dichasia vel pleiochasia umbelliformia densiuscula gerentibus, floribus partim sessilibus, partim pedicello tenuiore vix 2 mm. superante suffultis. *Flores* ♀ vivo albi, sicco bicolores, infra cuprosi, supra atri, limbo pallidiore, basi bracteolis 3, 0.75–1 mm. longis, lanceolatis, infra coalitis, lateralibus angustioribus, plus minusve acutiusculis, parum hirtulis induti. *Perianthia* ♀ breviter tubuloso-infundibuliformia, 3 mm. longa, tubo 1 mm. crasso, infra dimidium minute cuproso-hirtula, supra id glabrata, limbo 2 mm. lato, obscure lobulato, lobulis fere omnino membrana pallidiore conjunctis. *Germen* 4 mm. longum, ovario ovato, sine limite in stylum crassiusculum attenuato, stigmate 1 mm. lato, ad 2 mm. e limbo exserto, tenuiter fimbriato. *Staminodia* 1 mm. longa, subulata, antheris minutis.

BRITISH GUIANA. Kabakaburi, Pomeroon District, Feb. 1923, J. S. De La Cruz 3317 (type in Kew Herb., distributed from the New York Botanical Garden). “7 ft. tall; flowers white.”

Indumento rigidulo, subsetuloso in innovationibus, petiolis, foliorum costis, foliis magnis oblongo-ellipticis costa excepta glabris breviter acuminatis fere in dimidio latissimis, inflorescentiis ♀ haud spectabilibus, pedunculo piloso debiliore plus minusve arcuato portatis, subumbellatis, floribus ♀ vivo albis, infra cuproso-hirtulis, in limbo fere elobatis recognoscenda.

Pisonia glabra *Heimerl*, sp. nov. ; glabritie fere omnium partium imprimis ramificationum, foliorum, inflorescentiarum, perianthiorum, foliis dense et prominenter utrinque reticulatis, perianthiis anguste infundibuliformibus, staminibus fere semper 8 distincta.

Arbor vel frutex, circiter 14 m. alta. *Rami* vel divaricato- vel irregulari-ramificati, griseobrunnei, omnino (etiam in innovationibus) glabri, gemmis solum paululum cuproso-hirtulis. *Folia* (minora breviter elliptica, cito in petiolum usque 10 mm. longum contracta, 2.2-4.5 cm. longa, 1.4-2.6 cm. lata, antice obtusa vel rotundata) pleraque petiolo 1.4-2.8 cm. longo, usque 2 mm. crasso, glabro suffulta, late elliptica vel oblongo-elliptica vel elliptico-lanceolata (rarius in formam obovatam leviter vergentia), usque 14.2 cm. longa et 6.2 cm. lata, vulgo in dimidio latissima, saepe utrinque fere aequae angustata ad subacuminata, apice ipso plus minusve acuto breviter prominente, in sicco brunnea, concoloria, coriacea, supra nitida, infra opaca, etiam prima evolutione glabra, costa validiuscula, infra magis prominente, nervis secundariis 6-15 utrinque, leviter arcuatis, sub angulo 70-80° abeuntibus, frequentissime ramificatis, nervatura itaque eximie reticulata et utraque facie (supra fere acute) prominente. *Inflorescentiae* ♂ pedunculo stricto, 3-8.5 cm. longo, glabro suffultae, breviter corymboso-paniculatae, usque 5.4 cm. latae et 4 cm. longae, plus minusve floribundae, plus minusve densae, pallide virides, glabrae (raro in ramulorum angulis sparsissime pulverulenter hirtae), ramificationibus strictiusculis, haud tenuibus, ramis primariis usque 5, varie ordinatis, 1-2 cm. longis, vel apice paucos flores directe gerentibus vel iterum varie ramificatis, ramis secundariis vel flores singulos vel flores 2-4 plus minusve dense confertos praebentibus, floribus vel sessilibus vel pedicello usque 2.5 mm. longo minus tenui suffultis. *Flores* ♂ vivo pallide virides, basi bracteolis 3-4, vix 1 mm. longis, lanceolatis, subaequalibus, acutiusculis, fere glabris induti. *Perianthia* ♂ anguste infundibuliformia, 6-6.5 mm. longa, superne 3-3.5 mm. lata, fere aequaliter a basi in limbum ampliata, glabra, limbo (initio supra papilloso) levissime lobulato, lobulis valde brevibus obtusis. *Stamina* 8 (raro 9), 6.5-10.5 mm. longa, partim bene exserta, filamentis albis, antheris 0.75 mm. longis. *Germinis rudimentum* 4-5.5 mm. longum, ovario ellipsoideo, breviter stipitato, stylo paullo crassiore, apice truncato, vix papilloso.

BRITISH GUIANA. Upper Demerara River, shrub, Sept. 1887, *Jenman* 3978. Moraballi Creek, Essequibo River, Oct. 1929, *Sandwith* 533: low tree, 45 ft. high, in wallaba forest on sandy

ridge ; inflorescence wholly pale green ; perianth slightly frilled at the edge ; filaments white.

POLYGONACEAE.

Coccoloba gymnorrhachis *Sandwith*, sp. nov. ; *C. striatae* Benth. forsan affinis, costis ochrearum haud conspicue persistentibus, inflorescentiis longioribus rhachi glabra neque minute tomentella, ochreolis bractea subduplo longioribus differt.

Frutex altissime scandens, ramulis summis cinereis corrugatis, hornotinis nigrescentibus striatis lenticellatis. *Ochreae* caducae, adpresse pilosae, 4-7 mm. longae. *Folia* obovato-elliptica usque elliptica, apice 0.5-1 cm. abrupte acuminata vel cuspidata, basi leviter sed semper distincte cordata, 6-14.5 cm. longa, 3-7 cm. lata, glabra, rigide chartacea vel seniores subcoriacea, utrinque nitidula, utrinque subtilissime reticulata venulis in foliis senioribus supra impressis sed in junioribus prominulis, nervis primariis utroque costae latere vulgo 10-14 in medio folio costam angulo 45-60° relinquentibus sursum longe arcuantibus atque marginem versus anastomosantibus ; petiolus nigrescens, glaber, 0.7-2 cm. longus. *Inflorescentiae* apice ramulorum brevium terminales, solitariae, simplices, foliis longiores, saepius 14-23 cm. longae, rhachi omnino glabra sulcata haud (vel in planta surinamensi sparse) lenticellata, pedunculo 1-2 cm. longo prope basim nonnunquam florifero, nodulis bifloris. *Bractea* parva, ovata, obtusa, glabra, sub flore aperto pallide flavescens, vix ad 1.5 mm. longa atque lata. *Ochreolae* 2, bractea fere duplo longiores, bilobae, glabrae, 2.5-2.8 mm. longae ; exterior pedicellum vetustum jam disarticulatum ac ochreolam secundam floriferam includens. *Pedicelli* glabri, ochreolis paullo superati. *Perianthium* albo-viride ; tubus campanulato-obconicus, sparse pilosulus, vix 1 mm. longus, vix 1.5 mm. latus ; lobi ovati, obtusi, minutissime ciliolati, ad 1.75 mm. longi, ad 1.3 mm. lati. *Stamina* exserta, glabra, filamentis inaequalibus e basi lata 1.3-1.8 mm. longis. *Ovarium* glabrum, cum stylis 3 ad 2 mm. longum. *Fructus* (plantae surinamensis) ovoideo-fusiformis, apice obtuso, vulgo 1-1.2 cm. longus, 8 mm. diametro, glaber, verruculosus, siccitate brunneus, lobis perianthii apice adpressis, pedicellis ad 6 mm. longis.

BRITISH GUIANA. Moraballi Creek, Essequibo River, Sept. 3rd, 1929, *Sandwith* 168 (type in Kew Herb. ; dupl. in Herb. New York, Rio de Janeiro, Utrecht). A bush-rope in mixed forest ; flowers whitish-green.

SURINAM. Forest reserve, Brownsberg, fr. Nov. 1924, *Herb. Boschuwezen* no. 6773 (Utrecht, Kew). This collection was compared at Utrecht with the type collection by Mr. P. J. Eyma, and fragments have been presented to the Kew Herbarium. It is satisfactory to be able to include a description of the fruit.

PODOSTEMONACEAE.

The following species, only recently described and previously unrepresented at Kew, have kindly been identified by Mr. G. Taylor, of the British Museum Herbarium :—

Marathrum Jenmanii *Engl.* in *Engl. Jahrb.* lxi. Beibl. 138, 5 (1927).

Cuyuni River ; in depressions on the flat rocky shore of an islet at the Akaio Falls, Nov. 25th, 1929, *Sandwith* 694 : scapes short and thick, reddish-mauve, shorter than the olive-brown sheath ; filaments whitish-mauve ; anthers greenish-pink ; ovary and style dark reddish-violet ; stigma uncloven, blackish.

Jenmaniella varians *Engl.* l.c. 7.

Essequibo River ; on low flat rocks on the right bank at the first Falls, Oct. 14th, 1929, *Sandwith* 446 ; plants light red and green, very small and densely crowded, flowering when still damp but just not submerged ; stamens 1-2, with filaments much longer than the gynaecium ; anthers greenish.

MYRISTICACEAE.

Iryanthera paraënsis *Huber* in *Bol. Mus. Pará*, v. 358 (1909).

Moraballi Creek, Essequibo River, Oct.-Nov. 1929, *Sandwith* 429 ♂, and 542 ♀. A small tree, 30-50 ft. high, in mixed forest ; branchlets ferrugineous ; male flowers white, female pinkish-cream with green stigma ; the female inflorescences are much shorter than the male, which are remarkably long.

Vernacular name (Arawak), Kirikowa.

Distr. Pará. The first record from British Guiana.

Kindly confirmed by Dr. Ducke, who remarks that *I. elongata* Huber is only a form of this species.

MONIMIACEAE.

Siparuna decipiens (*Tul.*) *DC.* *Prodr.* xvi. pt. 2, 643 (1868).—*Citriosma decipiens* *Tul.* *Monogr.* 368 (1855).

Moraballi Creek, Essequibo River, Sept.-Oct., 1929, *Sandwith* 346, 412 : a small tree, 25-40 ft. high, 6 in. diam., in mixed forest ; leaves and inflorescence silvery-lepidote. Previously collected in the Colony by *Mansfield* and *Kortright*, *Herb.* no. 8737, at Bonasika, Essequibo River, in 1909.

Distr. French Guiana to Rio Acre (Bolivia).

LAURACEAE.

Aniba (subgen. *Ajoueopsis* *Mez*) **hypoglauca** *Sandwith*, sp. nov. ; in hoc subgenere foliis subtus glaucis, inflorescentia pseudoterminali, ovario glaberrimo quam stylo multo brevior distinguenta.

Arbor mediocris in eperuetis crescens, cortice pallide brunneo squameo in laminas verticales decorticante ; ramuli summi sulcato-angulati, indumento pallide fulvo tomentelli, demum glabrati cinerei. *Folia* lanceolata, elliptica, usque obovato-elliptica, apice

sensim satis longe (ad 1.5 cm.) conspicue acuminata, basi attenuata cuneata, 3-13.5 cm. longa, 1.3-4.3 cm. lata, supra glabra olivacea nitidula nervis impressis atque subtilissime areolata, subtus (siccitate saltem) glauca pilis adpressis satis dense pubescentia costa nervisque primariis utroque latere 10-12 elevatis venulis haud conspicuis; petiolus debilis, saepe curvatus, supra canaliculatus, 6-12 mm. (vulgo 10 mm.) longus. *Inflorescentiae* pyramidalithyrsoideae, apice ramulorum complures pseudo-terminales, racemose dispositae, passim dense tomentellae; bractaeae bracteolaeque subfoliaceae, caducae, 3-10 mm. longae. *Flores* flavescentes; pedicelli nutantes, nonnunquam penduli, sulcati, 1.5-5 mm. longi. *Perianthii* tubus conspicuus, urceolatus, sub lobis constrictus, 1.5 mm. longus, 1 mm. latus, extra griseo-tomentellus, intus longe dense sericeo-pilosus; lobi subaequales, exteriores majores, ovati, 0.5-0.7 mm. longi atque lati, utrinque plus minusve tomentelli, siccitate brunnescentes, flore maturo stylo necnon saepe androecio superati. *Staminum* series duae exteriores antheris glabris introrsis, filamentis pilosis antheris paullum longioribus aequilatis; series tertia staminodialis, in medio biglandulosa, filamentis pilosis, tum supra glandulas contracta liguliformis pilosa. *Ovarium* ellipsoideum, glabrum, circiter 0.75 mm. longum, sensim in stylum glabrum multo longiorem ad 1.75 mm. longum transiens. *Fructus* ovoideo-ellipsoideus, 2.2 cm. longus, 1.5 cm. diametro; cupula nigrescens, pubescens, corrugata, haud multum verrucosa, hemispherica, 7-8 mm. alta, 1.1-1.5 cm. diametro.

BRITISH GUIANA. Warimia Creek, Essequibo River, June 6th, 1929, *Forestry Department* record nos. 941 and 942 (type). "Middle-sized tree, 18 in. diam., in wallaba forest on gentle slope on white sand. Slightly buttressed. Bark light brown, scaly, peeling off in vertical stripes. Blaze pale yellow, very aromatic. Flowers yellowish."—*T. A. W. Davis*.

Vernacular name (Arawak), Yellow or Gale Silverballi.

Ocotea rubra Mez in Jahrb. Bot. Gart. Berlin, v. 258 (1889).

Moraballi Creek, Essequibo River, Oct. 11th, 1929, *Sandwith* 424. A large tree, over 100 ft. high, 23 in. diam., in greenheart forest; also seen in mixed and wallaba forest. Wood very fragrant, recalling the scent of *Angelica*. Buds white.

Vernacular name, Determa.

Distr. French Guiana. Apparently first record for British Guiana.

O. oblonga (Meissn.) Mez, l.c. 367.—*O. Hartiana* Mez in Urb. Symb. Antill. ii. 251 (1900) reducenda, fide Mez in sched. in Herb. Mus. Berol. *Mespilodaphne? oblonga* Meissn. in DC. Prodr. xv. pt. 1, 107 (1864).

Moraballi Creek, Essequibo River, Sept. 15th, 1929, *Sandwith* 264. A large tree in morabukea forest; buds greenish-yellow.

Distr. Trinidad, French Guiana. Apparently first record for British Guiana.

Nectandra (subgen. **Synandrodaphne** *Meissn.*) **praeclara** *Sandwith*, sp. nov. ; *N. dioicae* Mez affinis, indumento ramulorum arcte adpresso sericeo, foliis oblongis apice saepe rotundatis oblique cuspidatis, inflorescentiis longis laxioribus, pedicellis longioribus valde distincta.

Arbor excelsa, circiter 30 m. alta, 20–30 cm. diametro, in eperuetis crescens ; ramuli subteretes, obscure angulati et striatuli, pilis arcte adpressis flavicantibus dense subnitenti-sericei. *Folia* oblonga vel oblongo-elliptica, apice in cuspidem vel mucronem angustum acutissimum ad 5 mm. longum saepe obliquum abrupte attenuata vel rotundata, rarius in exemplis male evolutis truncata emarginata, basi cuneata saepe obliqua, 5–20 cm. longa, 3–7 cm. lata, coriacea, supra nitida olivacea sparse pubescentia vel glabra, subtus opaca glaucescentia passim arcte minute sericeo-pubescentia, utrinque praesertim subtus valde intricatissime reticulata, nervis primariis utroque costae latere 4–7 supra cum costa venulisque immersis subtus valde elevatis sursum longissime sensim arcuatis atque margine ipso demum anastomosantibus ; petiolus indumento ramulorum indutus, valde corrugato-sulcatus, 1–3 cm. longus. *Inflorescentiae* numerosae, speciosae, axillares, laxae thyrsoidae, foliis superatae, saepius 9–17 cm. longae, totae flavicanti-vel cinereo-sericeae ; rami primarii vulgo 1–2.3 cm. longi ; cymae satis laxae, floribus haud stipatis ; pedicelli vulgo 2–5 mm. longi. *Flores* dioici, masculi tantum visi, flavi, 4–5 mm. diametro. *Perianthium* siccitate extra cinereo-sericeum, intus brunneum atque cinereo-tomentellum ; tubus conspicuus subglobosus, ad 2 mm. longus, ad 2.5 mm. latus ; lobi ovati, obtusi, subaequales, ad 1.75 mm. longi atque lati. *Antherae* exteriores perfectae quadratae, sessiles, apice truncato maturitate inflexo, glabrae, basi sericea excepta. *Ovarii rudimentum* anguste ellipsoideum, dense albo-pilosum, cum stylo brevi glabro ad 1.2 mm. longum.

BRITISH GUIANA. Moraballi Creek, Essequibo River, Oct. 7th, 1929, *Sandwith* 387 (type) : tall tree, 101 ft. high, 8½ in. diam., on ridge in wallaba forest ; branches of inflorescence peach-bloom colour ; pedicels orange-red ; perianth-lobes creamy-yellow ; anthers green. *Ibid.*, Oct. 29th, 1929, *Sandwith* 535 : tall tree, 92 ft. 7 in. high, 1 ft. diam., in wallaba forest on sandy ridge ; floral parts exactly as in no. 387. Near Monkey Creek, Anarika Line, Demerara–Essequibo Railway, March 1910, *C. W. Anderson* 62 : a female tree, bearing fruit ; berry ovoid-subglobose, about 1 cm. long, shortly apiculate ; cupules 8–9 mm. long, up to 1.3 cm. wide, greyish-tomentellous round the margin at the apex, otherwise blackish and glabrescent, gradually narrowed into a thickened pedicel about 7 mm. long and 5 mm. wide at the apex.

Vernacular names (Arawak), Shirua ; Broad-leaved Soft Silverballi (Anderson).

HERNANDIACEAE.

Sparattanthelium guianense *Sandwith*, sp. nov. ; forma fructus ad *S. amazonum* Mart. approximans, indumento foliorum statim distinguenda ; *S. Burchellii* Rusby foliis membranaceis subtus velutinis, fructu latiore differt ; *S. tarapotanum* Meissn. fructu multo longiore, *S. Botocudorum* Mart. et *S. Tupinambazum* Mart. forma fructus ipsa, toto caelo discrepant.

Frutex ingens, altissime scandens ; ramuli summi striati, apicem versus dense pilosuli, inferne brunnescentes glabrescentes. *Folia* forma atque magnitudine valde variabili, lanceolato- vel ovato- vel obovato-elliptica, apice nonnunquam sensim longe conspicue (1-2 cm.) acuminata, nonnunquam rotundata plus minusve abrupte breviter cuspidata, basi rotundata vel saltem obtusa, 4-16.5 cm. longa, 2-8 cm. lata, rigide chartacea usque coriacea, margine revoluta, supra siccitate olivaceo-nigrescentia lucida juventute secus nervos pubescentia mox glabrata, subtus pallidiora olivacea vel grisea juventute passim crispule pilosula senectute praeter nervos venulasque sparse sed regulariter pilosulas glabrata, basi trinervia nervis primariis ceteris lateralibus e costa supra medium exorientibus, nervis venulisque supra impressis obscuris vel haud prominulis, subtus praesertim in foliis majoribus vetustis valde intricate pulchre reticulatis, nervis secundariis plus minusve rectis parallelis e primariis angulo recto exorientibus ; petiolus dense pilosulus vel senectute glabratus, satis brevis, 0.5-3 cm. longus. *Inflorescentiae* numerosae, generis typicae, maturitate ad 20 cm. longae, laxae atque late divaricatae, pedunculis ramisque pubescentibus, floribus pedicellisque cinereo-villosulis ; partes masculae densiflorae, femineae pauciflorae ; pedunculus primarius saepius 5-8 cm. longus. *Perianthium masculum* pedicello filiformi flexuoso 2-3 mm. longo, 4-5-partitum ; lobi elliptici vel obovato-elliptici, 2-2.5 mm. longi, ad 1.25 mm. lati ; stamina 4-5, antheris circiter 1 mm. longis, filamentis glabris brevissimis circiter 0.25 mm. longis ; stylus pilosus, fere ad 2 mm. longus. *Perianthium femineum* pedicello longiore 5-8 mm. longo, 5-partitum ; tubus cum ovario primum 1.25 mm. longus 1 mm. latus, mox nigrescens pilosulus ad 3 mm. longus ; lobi lineari-oblongi, ad 2.5 mm. longi, ad 0.75 mm. lati ; stylus pilosus, 2 mm. longus. *Inflorescentia fructifera* habitu insigni generis typico, ossea, argenteo-candida, nodosa, pubescens vel glabrata. *Fructus* argenteo-griseus, glaber, rugulosus, haud conspicue costatus, angustus, ellipsoideo-oblongus, 1.5-1.6 cm. longus, 6-7 mm. diametro, vertice reliquiis floralibus haud ad 1 mm. longis coronatus.

BRITISH GUIANA. Moraballi Creek, Essequibo River, Oct. 17th, 1929, *Sandwith* 470 (type) : bush-rope in mixed forest ; young inflorescence very pale pinkish-brown ; old inflorescence and fruit silvery-grey. Demerara River, May 1889, *Jenman* 4889.

The lower inflorescences of any given branch are often predominantly female and the upper predominantly male, but they are sometimes entirely of one sex or the other. As the comparatively

few-flowered female inflorescences or inflorescence-branches develop the earlier, they have a very different facies from the male by the time the latter have reached maturity, since only their long-stalked terminal flowers remain.

In the course of writing up the material of this genus in the Kew Herbarium, a Mexican sheet was discovered which cannot be assigned to any known species and may be described here as follows :

Sparattanthelium septentrionale *Sandwith*, sp. nov. ; indumento *S. tarapotani* Meissn. sed foliis pro rata latioribus, filamentis duplo longioribus, stylo longiore differt.

Frutex ? scandens, ramulis summis dense conspicue pilosis. *Folia* ovata vel elliptica, apice conspicue (1-1.5 cm.) acuminata, basi obtusa vel rotundata, 6-12 cm. longa, 2-5 cm. lata, chartacea, nitidula, supra nervis dense mesophyllo sparse pilosa, subtus densius pilosa praesertim juniora subvelutina, basi trinervia, nervis primariis ceteris lateralibus e costa supra medium exorientibus, matura utrinque laxe satis conspicue reticulata ; petiolus dense flavescens-pilosus, velutinus, 1.3-2.2 cm. longus. *Inflorescentia* generis typica, circiter 5 cm. longa, passim cinereo-pubescent, pilis patulis apice falcato-uncinatis inter minores magis adpressos conspicuis ; rami ramulique gracillimi, intricati, multiflori. *Alabastra* minima, vix ad 1 mm. diametro ; pedicelli maturi ad 4 mm. longi, gracillimi, flexuosi. *Perianthium* masculum 5-6-partitum ; lobi elliptici, obtusi, inaequales, 1.5-2 mm. longi, ad 1 mm. lati. *Stamina* 5, antheris 1 mm. paullum excedentibus, filamentis glabris 0.5 mm. longis. *Stylus* pilosus, 1.75 mm. longus. *Fructus* ignotus.

MEXICO. "Yucatan and Tabasco," *Dr. E. P. Johnson* 129 in *Herb. Benth.*, comm. *Torrey*, 1850.

The only other species hitherto recorded from Central America, *S. guatemalense* Standley, is said to have glabrous leaves and branchlets, and a 4-lobed perianth. The Jurgensen specimen from South Mexico referred to by Hemsley in *Biol. Centr.-Amer.* i. 405 (see Standley, *Trees and Shrubs of Mexico*, p. 1656) is certainly not *S. guatemalense* but agrees well with Brazilian specimens of *S. Botocudorum* Mart., and it is conceivable that the label has been misplaced. *S. Botocudorum* has a much finer and, on the mature leaves, sparser indumentum than *S. septentrionale*, while its inflorescence-branches and pedicels are less slender, and its buds larger ; the floral parts of the two species are very similar.

PROTEACEAE.

Panopsis sessilifolia (*Rich.*) *Sandwith*, comb. nov.—*Roupala sessilifolia* Rich. in *Act. Soc. Hist. Nat. Par.* i. 106 (1792). *R. hameliaefolia* Rudge, *Pl. Guian.* 22, t. 31 (1805). *Panopsis hameliaefolia* Knight, *Proteaceae*, 104 (1809) ; Ducke in *Arch. Jard. Bot. Rio de Janeiro*, v. 103 (1930). *Andriapetalum sessilifolium* Klotzsch in *Linnaea*, xv. 53 (1841).

Moraballi Creek, Essequibo River, Oct. 1929, *Sandwith* 472, 483. Small to middle-sized tree, frequent in mora forest on the bank of the creek, also in mixed forest. Inflorescence creamy-green to pale mauve, open perianth sometimes white within ; stigma violet.

Vernacular name (Arawak), Mahoballi.

Distr. Guiana, Amazonian Brazil.

LORANTHACEAE.

Phthirusa monetaria *Sandwith*, sp. nov. ; *P. Myrsinites* Eichl. affinis, forma foliorum, venatione distincta, ternationibus distincte pedunculatis, forma staminum differt.

Frutex parasiticus. *Ramuli* fusci usque fusco-purpurei, squamuloso-furfuracei, senectute glabrescentes, crebre foliosi, internodiis 1-3 cm. longis. *Folia* opposita, orbicularia vel suborbicularia, late elliptico-oblonga vel nonnunquam obovata, apice late rotundata, raro leviter emarginata, basi rotundata vel obtusa vel rarius acuta, 1-6.5 cm. longa, 0.7-5.2 cm. lata, apicem ramulorum versus valde decrescentia, coriacea, opaca, siccitate purpurascentia rugulosa, satis conspicue 5-7-plinervia, nervis ramosis ac apicem versus anastomosantibus ; petiolus furfuraceus, crassus, 2.5-5 mm. longus. *Glomeruli* axillares ut ramuli squamuloso-furfuracei, e ternationibus 2-6 conspicue pedunculatis compositi, ad 7 mm. longi ; pedunculi ternationum 1-3 mm. longi ; bractearum cupulae circiter 1 mm. altae, ad 2.5 mm. latae, lobis late triangularibus. *Flores* hermaphroditi, flavo-virides. *Hypanthium* cupulare, 1 mm. altum, 1.2 mm. latum, apice irregulariter lobatum minutissime ciliolatum. *Petala* 6, lineari-oblonga, 1.8-2 mm. longa, 0.5 mm. lata. *Stamina* longiora duos petali trientes saepe excedentia, breviora vix attingentia, infra medium inserta, filamentis parte libera ad 0.3 mm. longa ; longiora filamentis latis incrassatis, basi ac apice petalo aequilatis, medio utroque latere profunde excavatis ; breviora filamentis e basi usque antheras sensim angustatis ; antherae utriusque seriei subsimiles, sed eae staminum longiorum magis triangulares, omnes locellis subaequalibus, connectivis brevissime obscure obtuse productis. *Ovarium* obovoideo-subglobosum, disco minute lobulato ; stylus ad 1.25 mm. longus, lineari-clavatus, tum prope apicem subito contractus ac utroque latere excavatus. *Bacca* ovoideo-ellipsoidea, ad 4 mm. longa, circiter 2 mm. diametro.

BRITISH GUIANA. Moraballi Creek, Essequibo River, Sept.-Oct., 1929, *Sandwith* 313 (type) and 421 : parasite on the crowns of large trees in wallaba and mixed forest ; flowers yellowish-green ; filaments reddish-brown ; anthers yellowish. Near Bartica, Essequibo River, 1886-7, *Jenman* 2534, 3635, 3639. Demerara River, 1889, *Jenman* 5344.

Duplicates are distributed to New York, Rio de Janeiro, Utrecht and Berlin.

MORACEAE.

Ficus Parkeriana (*Miq.*) *Sandwith*, comb. nov.—*Pharmacosycea Parkeriana* *Miq.* in Hook. Lond. Journ. Bot. vii. 71 (1848).

BRITISH GUIANA. Without locality, *Parker* (type). Demerara River, July 1907, *F. C. Foote*. Moraballi Creek, Essequibo River, Oct. 1929, *Sandwith* 473: epiphytic shrub at 80-100 ft., sending down thick laticiferous roots; receptacles pink.

Wrongly referred by the Index Kewensis to *F. Parkeri* Miq., which is a totally different species.

The following account of a new species of *Ogcodeia* is kindly contributed by Dr. J. Mildbraed of Berlin:

Ogcodeia guianensis Mildbr. in Notizbl. Bot. Gart. Berlin, xi. 422 (1932).

Small tree, about 50 feet high. *Young branchlets* glabrous, chestnut-brown when dry, a little shining, 2 mm. thick. *Leaves* shortly petioled, petiole 3-6 mm. long, 1 mm. thick; lamina oblong, obtuse and nearly always inaequilateral at the base, acuminate at the apex, acumen 10-12 (in the smaller ones 5) mm. long, very obtuse, 6-14 (mostly about 12) cm. long and 1.7-4.5 (mostly 3-4) cm. broad, quite glabrous; midrib prominent on both sides, on the upper more than on the lower, lateral nerves 12-16 at each side of the midrib, nearly straight, arcuately united at about 2 mm. from the margin, with the reticulated veins not very conspicuous on the upper surface, more prominent on the lower. *Female receptacles* in the fruiting stage depressed-globose, about 4 cm. diam., not surrounded by perianth-like large bracts at their base, subsessile; tubercles of the receptacle (the free tips of the perianth-leaves) nearly as broad at their base as high (4-5 mm.), irregularly 3-5-gono-pyramidate, obtusely apiculate at the apex, almost woody, gradually changing towards the base into smaller and smaller, bract-like, but always thick and woody, appressed scales; styles in a younger receptacle only half as long as the tubercles, divided into two branches about 5 mm. long. *Male inflorescences* at present unknown.

BRITISH GUIANA. Cuyuni River; on the right bank below the Akaio Falls, Nov. 26th, 1929, *Sandwith* 698. (Herb. Kew., Berol., Novoebor., Rio de Janeiro.) The inflorescences exude a very sticky, creamy-white latex.

Easily distinguished from all other species of the genus by not having the female receptacles surrounded by large perianth-like bracts at their base.

TRIURIDACEAE.

Sciaphila (§Soridium) guianensis *Sandwith*, sp. nov.; *S. Spruceanae* (Miers) Engl. affinis, pedicellis gracilibus fructiferis multo longioribus, segmentis florum epapillosis, forma antherarum, stylo ovarium superante apice haud obvie incrassato, statim distinguitur; a *S. albescente* Benth. stylo multo brevior apice haud penicellato-piloso differt.

Herba saprophytica, caule sulcato simplici ad 18 cm. alto. *Folia* caulina lineari-subulata, ad 3 mm. longa. *Racemus* 2-4.5 cm. longus; bracteae foliis similes, ad 2.5 mm. longae; pedicelli

floriferi graciles, saepe flexuosi, patuli, 3-5 mm. longi, fructiferi adscendentes vel patuli, 7-10 mm. longi. *Flores albi, inferiores* emineae; segmenta 4, ovata, inaequalia, circiter 1.5 mm. longa, 0.5-1 mm. lata; carpella glabra, 0.3-0.4 mm. longa atque diametro, stylo laterali vel subbasali ovarium paullo superante vix duplo longiore apice vix incrassato haud penicellato-piloso. *Flores superiores* masculae; segmenta 4, ovata, inaequalia, 1-1.2 mm. longa, 0.5-1 mm. lata, epapillosa; stamina 2, magna, reniformi-semicircularia, 0.6 mm. alta, 0.8 mm. lata. *Fructus* in capitulis 3 mm. diametro aggregati; fructus singulus obovoideo-oblongus, circiter 1.2 mm. longus, 0.6 mm. diametro, epapillosus.

BRITISH GUIANA. Tinamu Fall, Cuyuni River, March 1931, *Martyn* 304. "Among dead leaves on the forest floor. Flowers white."

Apparently the first record of the occurrence in the Colony of this interesting family.

MARANTACEAE.

***Calathea zingiberina* Koern.** in Bull. Soc. Nat. Mosc. xxxv. pt. 1, 122 (1862); K. Schum. in Engl. Pflanzenreich, Marantac. 110 (1902).

Moraballi Creek, Essequibo River, Nov. 8th, 1929, *Sandwith* 575. Matope Line, Cuyuni River, Feb. 1931, *Forestry Department* record no. 1084.

Distr. Surinam, Brazil (Pará). The first records from British Guiana.

A herb, 3-5½ ft. high, characteristic of bare forest floor on dry hills of mixed forest. The inflorescence is produced from the rhizome and is almost hidden among the dead leaves of the forest floor, so that it is rarely noticed. The colour of the large flowers is a beautiful lemon-yellow. It is interesting to note that Spruce writes of this species, which he discovered by the Rio Aripicurú, Rio Trombetas, that it bore "yellow *Crocus*-like flowers from the root: it covered the top of a sandy hill, under the trees, where the cutias and agoutis had burrowed extensively." (See Notes of a Botanist on the Amazon and Andes, i. 97.)

XXIX.—RESEARCHES ON *SILENE MARITIMA* AND *S. VULGARIS*: VIII.* E. M. MARSDEN-JONES AND W. B. TURRILL.

GENETICS OF ANTHOCYANIN INHERITANCE AND OF OTHER CHARACTERS IN *S. MARITIMA*.

In the third paper of this series (*K.B.* 1929, 171) we refer to the occurrence, in a wild population of *S. maritima*, of plants devoid of anthocyanin in all their parts. Two such plants were collected opposite Wyke Regis and described as Stock-Plants A.7 and A.12 in the paper quoted (pp. 147, 150). Another plant, collected near Porlock, Somerset, was described as A.20 (*l.c.* 153). The last plant

*Continued from *K.B.* 1931, 397.

had pink immature seeds, but was otherwise devoid of anthocyanin, being of a yellow-green colour. The essential characters of these three plants can be summarized as follows (l.c. 168) :—

A.7. L.2.4.6. K.1. C.1.3.5.7.9.12.13. A.1. G.2.4. F.2. Se.1.
A.12. L.1.4.6. K.1. C.1.3.5.7.9.12.13. A.1. G.2.4. F.2. Se.1.
A.20. L.2.4.6. K.1. C.2.4.5.8-9.10-11.12.13. A.1-2. G.2.3. F.2.
 Se.1.

These three plants were crossedd in pairs mainly with the object of investigating the genetic behaviour of anthocyanin development and distribution in the various organs. The results of experiments, including selfings and crossings carried on to F₂ generations, are given below.

SELFINGS OF PARENT STOCK-PLANTS.

N.15. Stock-plant 7 selfed, 49 plants in generation, uniform for all characters studied except where stated.

Habit prostrate, stems 2-3.4 dm. long ; with barren stems ; whole plant absolutely devoid of anthocyanin.

Leaves oblanceolate or narrowly oblong-elliptic to narrowly ovate or obovate, glaucous green.

Inflorescence of 1-3 flowers, erect when in bloom, actinomorphic.

Calyx broad in flower.

Corolla of 38 plants with petals and segments contiguous or overlapping, of 11 with petals overlapping and segments not overlapping, lamina lobed $\frac{3}{4}$, scales well developed, no anthocyanin blotch.

Androecium with filaments white ; 47 plants with hermaphrodite, 2 with female flowers.

Gynaecium with stigmata and immature seeds white.

Ripe capsules obloid with strongly recurved teeth.

Mature seeds armadillo.

Result.—Stock-Plant 7 on selfing bred true for all characters except for divergence of petal segments in 11 plants and in the throwing of 2 females. It would appear that this plant was heterozygous for overlapping or otherwise of petal segments and segregated in a 3.45 : 1 ratio.

N.20. Stock-plant 12 selfed, 79 plants in generation, uniform for all characters studied, except where stated.

Habit prostrate, stems 2.3-4 dm. long ; with barren stems ; whole plant absolutely devoid of anthocyanin.

Leaves oblanceolate or narrowly oblong-elliptic to narrowly ovate or obovate, glaucous green.

Inflorescence of 1-3 flowers, erect when in bloom, actinomorphic.

Calyx broad in flower.

Corolla with petals and segments contiguous or overlapping, lamina lobed $\frac{3}{4}$, scales well developed, no anthocyanin blotch.

Androecium with filaments white ; 65 plants with hermaphrodite, 14 with female flowers.

Gynaecium with stigmata and immature seeds white.

Ripe capsules of 2 plants broadly ovoid, of 65 obloid, of 12 not scorable, with strongly recurved teeth.

Mature seeds armadillo (5 not scorable).

Result.—Stock-plant 12 on selfing bred true for all characters studied, except in the throwing of 14 females and 2 plants with obloid capsules.

N.18. Stock-plant 20 selfed, 16 plants in generation, uniform for all characters studied, except where stated.

Habit prostrate, stems 2.2–3.2 dm. long; with barren stems; whole plant absolutely devoid of anthocyanin.

Leaves linear to narrowly linear-lanceolate, yellowish green.

Inflorescence of 1–7 flowers.

Calyx of 11 plants broad, of 5 narrow.

Corolla with petals and segments scarcely contiguous, lobed $\frac{3}{4}$, scales not well developed, no anthocyanin blotch.

Androecium with filaments white (?), anthers purple (?); all hermaphrodite.

Gynaeceum with stigmata white, immature seeds pink.

Ripe capsules obloid.

Mature seeds armadillo.

Result.—Stock-plant 20 on selfing bred true for all characters studied, except for a fluctuation or segregation (?) in calyx shape.

F₁ GENERATIONS.

N.21. Stock-plant 7 (seed parent) × Stock-plant 12 (pollen parent), 93 plants in generation, uniform for all characters studied.

Habit prostrate, stems 1.7–4 dm. long; with barren stems; whole plant absolutely devoid of anthocyanin.

Leaves, *Inflorescence*, and *Calyx* as in generations of parents selfed.

Corolla as in generation of S.-P. 12 selfed (N. 20).

Androecium with filaments white; all hermaphrodite.

Gynaeceum with stigmata and immature seeds white.

Ripe capsules obloid.

Mature seeds armadillo.

Result.—Phenotypically, for the characters considered, the separately collected stock-plants 7 and 12 were alike. On selfing each bred true, except for divergence or overlapping of petal-segments (S.-P. 7) and capsule shape (S.-P. 12). On crossing together their offspring produced no anthocyanin in any organ. In characters of leaves, inflorescence, and calyx they were as the parents. In all corollas the petals and segments overlapped and it would appear that this character dominates over divergence, as, indeed, was expected from the results of selfing S.-P. 7 (see N. 15, above).

N. 19. Stock-plant 20 (seed parent) × Stock-plant 12 (pollen parent), 23 plants in generation, uniform for all characters studied, except where stated.

Habit prostrate, stems 3-3.5 dm. long; with barren stems; medium amount of anthocyanin in stems and calyces.

Leaves in general oblanceolate-linear.

Inflorescence as in generations of parents selfed.

Calyx of 19 plants broad, of 4 narrow.

Corolla in 19 plants with petals and segments contiguous or overlapping, in 4 scarcely contiguous, no anthocyanin blotch.

Androecium with filaments pink, anthers purple; all with hermaphrodite flowers.

Gynaeceum with stigmata white, immature seeds pink.

Ripe capsules of 1 broadly ovoid, of 22 obloid.

Mature seeds armadillo.

Result.—Phenotypically the separately collected stock-plants 20 and 12 were alike in being free from anthocyanin, except in the immature seeds of S.-P. 20. On selfing S.-P. 20 bred true for anthocyanin characters and S.-P. 12 also. On crossing together their offspring produced anthocyanin in stems, calyces, filaments, and immature seeds, but not in the stigmata.

N. 22. Stock-plant 20 (seed parent) × Stock-plant 7 (pollen parent), 2 plants in generation, uniform for all characters studied, except where stated.

Habit prostrate, stems 3.5-4 dm. long; with barren stems; medium amount of anthocyanin in stems and calyces.

Leaves, *Inflorescence*, and *Calyx* as in N. 15, except plant No. 1 yellow green, plant No. 2 glaucous green.

Corolla in No. 1 petals and segments overlapping, in No. 2 petals overlapping, segments not overlapping, no anthocyanin blotch.

Androecium with filaments pink, anthers purple; hermaphrodite.

Gynaeceum with stigmata white, immature seeds pink.

Ripe capsules obloid.

Mature seeds armadillo.

Result.—The separately collected stock-plants 20 and 7 were alike phenotypically in being free from anthocyanin except in the mature seeds of S.-P. 20. On selfing S.-P. 20 bred true and S.-P. 7 also for anthocyanin characters. On crossing together their offspring produced anthocyanin in stems, calyces, filaments, and immature seeds, but not in the stigmata.

F₂ GENERATIONS.

N. 57. Plant 2 of N. 19 selfed (i.e. F₂ from S.-P. 20 × S.-P. 12), 66 plants in generation.

Habit prostrate, stems 1.3-3.3 dm. long; with barren stems; 28 plants with medium amount of anthocyanin in stems and calyces, 38 with no anthocyanin in these organs.

Leaves as in immediate parent.

Calyx of 59 plants broad, of 7 narrow.

Corolla of all plants with petals and segments overlapping or contiguous, none with anthocyanin blotch. Two plants had each one petal of one flower multilobed.

Androecium with filaments in 24 plants pink, in 37 white; anthers in 23 purple, in 38 yellow-green; 50 plants with hermaphrodite flowers only, 11 with hermaphrodite and female, 5 with female flowers only.

Gynaeceum with stigmata of 11 plants pink, of 55 white; immature seeds of 36 pink, of 33 white. The combination pink stigmata and white immature seeds did not occur.

Ripe capsules of 49 broadly ovoid, of 15 obloid.

Mature seeds armadillo.

N.58. Plant 23 of N.19 selfed (*i.e.*, F_2 of S.-P.20 \times S.-P.12), 71 plants in generation.

Habit prostrate, stems 2.4–3.9 dm. long; with barren stems; 29 plants with medium amount of anthocyanin in stems and calyces, 42 with no anthocyanin in these organs. One plant was distinct in having deep yellow-green stems, foliage, and calyces.

Leaves as in immediate parent.

Calyx of 13 plants broad, of 58 narrow.

Corolla in 39 plants with petals and segments overlapping, in 32 petals overlapping and segments not overlapping, none with anthocyanin blotch; in all good scale; in all bilobed.

Androecium with filaments in 10 plants pink, in 33 white; anthers in 20 plants purple, in 23 yellow-green; 26 plants with hermaphrodite flowers only, 17 with hermaphrodite and female, 28 with female flowers only.

Gynaeceum with stigmata of 12 plants pink, of 59 white; immature seeds of 39 pink, of 32 white.

Ripe capsules of 36 broadly ovoid, of 13 obloid.

Mature seeds armadillo.

N.59. Plant 1 of N.22 selfed (*i.e.*, F_2 of S.-P.20 \times S.-P.7), 52 plants in generation.

Habit prostrate, stems 1.4–2.4 dm. long; with barren stems; 30 plants with medium amount of anthocyanin in stems and calyces, 22 with no anthocyanin in these organs.

Leaves as in immediate parent.

Calyx of 45 plants broad, of 6 narrow, of 1 unscorable.

Corolla of all plants with petals and segments overlapping or contiguous; none with anthocyanin blotch; in all good scale; in all petals bilobed.

Androecium with filaments in 28 plants pink, in 24 white; anthers in 29 purple, in 23 yellow-green; all hermaphrodite.

Gynaeceum with stigmata in 15 plants pink, in 34 white, in 3 unscorable; immature seeds in 40 pink, in 11 white, in 1 unscorable.

Ripe capsules obloid.

Mature seeds armadillo.

N.60. Plant 2 of N.22 selfed (*i.e.* F_2 of S.-P.20 \times S.-P.7), 56 plants in generation.

Habit prostrate, stems 2-3.4 dm. long; with barren stems; 42 plants with medium amount of anthocyanin in stems and calyces, 14 with no anthocyanin in these organs.

Leaves as in immediate parent.

Calyx of 48 plants broad, of 8 narrow.

Corolla in 22 plants with petals and segments overlapping, in 34 petals overlapping and segments not overlapping; in one plant only anthocyanin blotch in petals; in all good scale; in all petals bilobed.

Androecium with filaments in 23 plants pink, in 31 white; anthers in 42 purple, in 12 yellow-green, in 1 unscorable; 54 with hermaphrodite flowers, 1 with female, 1 unscorable.

Gynaeceum with stigmata of 4 plants pink, of 50 white, of 2 unscorable; immature seeds of 42 pink, of 13 white, of 1 unscorable.

Ripe capsules obloid.

Mature seeds armadillo.

DISCUSSION AND CONCLUSIONS.

Habit. All the plants investigated were clearly *S. maritima* and there were no divergences from characters already known for the species. Thus, the plants in all generations were prostrate and had barren stems like the stock-plant parents, while their flowers were actinomorphic.

Anthocyanin development. Before considering the results of scoring the selfings, F_1 and F_2 generations, it should be stated that, in general, in scoring bred material we simply contrast presence of anthocyanin with its complete absence. It is evident, from the results given below and from other published and unpublished results, that anthocyanin development and distribution in different organs (in *S. maritima* and *S. vulgaris*) depends on a number of genes which can be inherited independently. On the other hand, we know that there are environmental factors which interact with the gene complex to modify the intensity of colour. The hue of colour is, at least most often, the same (Eupatorium purple) in all organs where it occurs. Its pure appearance is, however, often masked, as by the green of the vegetative parts and the yellow-green of the anthers. There is some evidence that the tint (most often Laelia Pink or Pale Laelia Pink) is partly controlled by genes, possibly of cumulative behaviour. The action of environmental factors (such as drought, frost, disease, and mechanical injury), however, so overlaps that of the modifying genes that we have not found it practicable to score for colour intensity. Moreover, colour of detached organs often changes quickly and age of the organ also affects tint. The small size, texture, and pellucid appearance of some of the organs (filaments and stigmata, for example), and changes in moisture and light also set limits to the scoring of small differences in tone when very large numbers of varieties have to be dealt with in the fresh state. The



Scheme to show crosses analyzed in this paper. S.-P. indicates stock-plant. By "no anthocyanin" is intended "no anthocyanin in the vegetative parts."

curious differences in anthocyanin development and distribution in sea-coast, inland, and high-mountain populations of the species we are dealing with in this series will be discussed in later papers. It is, however, advisable to state that these differences have such high statistical significance that they cannot be regarded as accidental. The possible physiological functions of anthocyanin are well summarized by Onslow: *The Anthocyanin Pigments of Plants*, ed. 2, pp. 9, 82-104 (Cambridge, 1925). A comparison of our conclusions should also be made with those of Emerson for maize (Cornell Univ. Agric. Expt. Stat. Memoir, 39: 1921).

The three stock-plants used were devoid of anthocyanin in all parts with the exception of the pink immature seeds of S.-P.20. On selfing they all bred true for general lack of anthocyanin, except that all offspring of S.-P.20 selfed had pink immature seeds.

The results obtained in the F_1 and F_2 generations can be summarized as follows:—

F_1 .

N.21 (=S.-P.7 \times S.-P.12) gave no anthocyanin in any organ.

N.19 (=S.-P.20 \times S.-P.12) gave anthocyanin in stems, calyces, filaments, anthers, and immature seeds, but not in petals and stigmata.

N.22 (=S.-P.20 \times S.-P.7) gave anthocyanin in stems, calyces, filaments, anthers, and immature seeds, but not in petals and stigmata.

F_2 .

It will be noted that N.57 and N.58 are selfings of sibs as are also N.59 and N.60.

F_2 s from S.-P.20 \times S.-P.12.				F_2 s from S.-P.20 \times S.-P.7.			
		With anthocyanin	Without anthocyanin			With anthocyanin	Without anthocyanin
N.57 stems	28	38	N.59 stems	...	30	22
N.58 „	29	42	N.60 „	...	42	14
		57	80			72	36
N.57 filaments	...	24	37	N.59 filaments	...	28	24
N.58 „	...	10	33	N.60 „	...	23	31
		34	70			51	55
N.57 anthers	...	23	38	N.59 anthers	...	29	23
N.58 „	...	20	23	N.60 „	...	42	12
		43	61			71	35
N.57 stigmata	...	11	55	N.59 stigmata	...	15	34
N.58 „	...	12	59	N.60 „	...	4	50
		23	114			19	84
N.57 immature seeds		36	33	N.59 immature seeds		40	11
N.58 „ „		39	32	N.60 „ „		42	13
		75	65			82	24

In N.57, N.58, and N.59 all plants were without petal blotch. In N.60 one plant had the petals blotched with anthocyanin.

The following tentative suggestions are offered as possible or partial explanations of the results obtained :—

Stems. It is obvious that the interaction of a number of genes is necessary for anthocyanin production and consequently a number of genotypically different plants may be phenotypically alike in the absence of anthocyanin. S.-P.20 \times S.-P.12 (N.57 and N.58) gives ratios (from each of two F_1 sibs) approximating closely to 27 : 37, a modification of a trihybrid ratio. S.-P.20 \times S.-P.7 gives different ratios from each of two F_1 sibs, namely 9 : 7 (very nearly) and 3 : 1 (exactly). This strange result prevents the application of any simple scheme involving only complementary genes. There can be little doubt that complementary genes are involved and it seems possible that S.-P.20 contains an inhibiting gene (or inhibiting genes) whose action is absent in N.60. Whether this is due to chromosome aberrations, to an unknown action of the gene complex, or to some other cause we cannot say.

Filaments. The numbers available for filaments and anthers are less than for other organs by the number of female plants, all except one of which occurred (in F_2 s) in N.57 and N.58. For anthocyanin in filaments in N.57 the ratio 24 : 37 approximates closely to the 27 : 37 ratio and possibly the totals for the F_2 of S.-P.20 \times S.-P.12 should be accepted as representing the same ratio. It is probable that some filaments with traces of anthocyanin were wrongly scored owing to extreme dilution through reaction to external factors (a difficulty we have often encountered in scoring the pellucid filaments). In the F_2 s from S.-P.20 \times S.-P.7 the ratio 9 : 7 is nearly attained in N.59, but not in N.60.

Anthers. The figures obtained approximate in their ratios so closely to the ratios obtained for anthocyanin in the vegetative parts that a similar explanation must probably apply.

Although we suggest the same ratios for F_2 s for anthocyanin in stems, filaments, and anthers, it must be pointed out that all possible combinations for its presence or absence in these organs have been scored in the course of our *Silene* studies. Even if the basic genes for colour production are the same throughout at least much of the plant, and there is some evidence for this, their localized action in any given organ is genetically controlled by other genes, which may be such as set time limits to the action of one or more inhibitors. Localization in developing organisms can be equally well expressed in terms of succession in time as in terms of space, when the sequence of development is known.

Stigmata. Anthocyanin first appeared in F_2 plants. The original stock-plants could therefore be assigned any formulae which postulated that they bred true to absence of anthocyanin on selfing and produced some F_1 s having complementary factors, A and B, and an inhibitor, I, in the heterozygous condition. As, for example,

S.-P.20=A A b b I I .

S.-P.12=a a B B i i .

S.-P.7=a a B B i i .

There would then be expected ratios in the F_2 s of 9:55, those obtained being 23:114 and 19:84, which are slightly low on the coloured side.

Immature seeds. The ratios for N.57 and N.58 approximate to 9:7, those for N.59 and N.60 to 3:1. Immediate parents with complementary gene composition a b A B and A b A B would give these ratios on selfing.

Leaves. In all F_2 generations the leaves were as in the immediate F_1 parents. No striking divergencies from the specific norm occurred in any plants considered in this paper.

Calyx. In all the original parents this was broad. On selfing, S.-P.7 gave all broad, S.-P.12 gave all broad, and S.-P.20 gave 11 broad and 5 narrow.

F_1 . N.21 (S.-P.7 \times S.-P.12) gave all broad.

N.19 (S.-P.20 \times S.-P.12) gave 19 broad and 4 narrow.

N.22 (S.-P.20 \times S.-P.7) gave all broad (2 plants only).

F_2 . N.57 (N.19, Plant 2, with broad calyx, selfed) gave 59 broad and 7 narrow.

N.58 (N.19, Plant 23, with narrow calyx, selfed) gave 13 broad and 58 narrow.

N.59 (N.22, Plant 1, selfed) gave 45 broad and 6 narrow.

N.60 (N.22, Plant 2, selfed) gave 48 broad and 8 narrow.

There is a considerable range in calyx shape within the species but our scoring has been into two classes only owing to the practical impossibility of satisfactory finer classification (see *Kew Bull.* 1929, p. 159). In spite of our wide class ranges there can be no doubt from the above figures that the characters broad and narrow calyx have a genetic basis and that in general terms broad is dominant over narrow. S.-P.20 is heterozygous, 7 and 12 are homozygous. N.19, an F_1 with S.-P.20 for one of its parents, segregated. N.22, also an F_1 with S.-P.20 for one of its parents, would no doubt have shown segregation had the generation been large enough. Segregation occurred in all generations in which S.-P.20 was involved. The immediate parents of N.57, N.59, and N.60 had broad calyces and the F_2 showed preponderance of broad calyces over narrow in ratios approximately between 8:1 to 6:1. On the other hand, the generation of N.58, whose immediate parent had narrow calyces, showed a preponderance of narrow calyces over broad in approximately a 4:1 ratio.

Corolla. In S.-P.s 7 and 12 the petals and segments all overlapped, in S.-P.20 they were scarcely contiguous. The following table summarizes the breeding results:—

		Petals and segments overlapping.	Petals overlapping, segments not overlapping.	Petals and segments scarcely contiguous.
N.15 (S.-P.7 selfed) ...		38	11	0
N.20 (S.-P.12 selfed) ...		79	0	0
N.18 (S.-P.20 selfed) ...		0	0	16
N.21 (S.-P.7 × S.-P.12) ...		93	0	0
N.19 (S.-P.20 × S.-P.12) ...		19	0	4
N.22 (S.-P.20 × S.-P.7) ...		1	1	0
		(Plant 1)	(Plant 2)	
N.57 (N.19 Plant 2 selfed) ...		66	0	0
N.58 (N.19 Plant 23 selfed) ...		39	32	0
N.59 (N.22 Plant 1 selfed) ...		52	0	0
N.60 (N.22 Plant 2 selfed) ...		22	34	0

It would appear from the above figures for selfing that S.-P.12 is homozygous for overlapping of petals and segments, S.-P.7 is heterozygous for overlapping of segments, and S.-P.20 is homozygous for a peculiar intermediate condition. In N.21 the overlapping of S.-P.12 completely dominates. In N.19 instead of clear dominance 4 plants out of 23 showed the condition of S.-P.20. In N.22 (involving S.-P.7) one plant had segments overlapping, the other had them not overlapping. S.-P.20 is involved in all the F_2 generations and doubtlessly accounts (with or without S.-P.7) for the segregation. N.57 was derived from an immediate parent with overlapping petals and segments and bred true to this character. Its sib generation, N.58, was derived from an immediate parent with corolla of the nature of S.-P.20 and threw almost as many plants with petals overlapping and segments not overlapping as of those with overlapping petals and segments. Again, N.59 was derived from an immediate parent with petals and segments overlapping and was uniform. Its sib generation, N.60, on the other hand, was derived from a parent with not overlapping segments and showed segregation. In spite of its uniform selfed generation it is obvious that S.-P.20 (perhaps in addition to S.-P.7) causes segregation in some F_2 generations. It appears that definite overlapping of segments is dominant over their not overlapping. Conclusions regarding the genetics of the overlapping of petals (as distinct from the overlapping of the two laminar segments of a single petal) cannot be reached in the plants here considered.

In the stock-plants, selfings, F_1 and F_2 generations, all plants had petals bilobed (bisegmented) for $\frac{3}{4}$ of their laminar length.

Sex. S.-P.7 and S.-P.12 had only hermaphrodite flowers, S.-P.20 had both hermaphrodite and female flowers. The following is a tabulation of the results obtained on breeding :—

		<i>Hermaphrodite</i> (or hermaphrodite and female)	<i>Female only.</i>
N.15 (S.-P.7 selfed)	... * ...	47	2
N.20 (S.-P.12 selfed)	65	14
N.18 (S.-P.20 selfed)	16	0
N.21 (S.-P.7 × S.-P.12)	93	0
N.19 (S.-P.20 × S.-P.12)	23	0
N.22 (S.-P.20 × S.-P.7)	2	0
N.57 (N.19 Plant 2 selfed)	...	61	5
N.58 (N.19 Plant 23 selfed)	...	43	28
N.59 (N.22 Plant 1 selfed)	...	52	0
N.60 (N.22 Plant 2 selfed)	...	54	1

Phenotypic characters alone give no insight into the genotypic nature of a plant for sex in *Silene*. Our general experience enables us to say that three groups can be determined but only after critical cultural and genetical investigation of individuals. These groups are (1) constantly hermaphrodite, (2) fixed (at least in *S. vulgaris*) or nearly fixed female, and (3) plants producing at the same or at different times female and hermaphrodite flowers, the former or the latter often much the more numerous. Under these conditions, for the particular crosses considered in this paper, we merely point out that S.-P.20 showed marked segregation on selfing, that no purely female plants appeared in F_1 generations, and that S.-P.20 was a grandmother of all F_2 generations and doubtlessly accounts for what segregation they show.

Mature seeds. All the original stock plants involved in the crosses here described, all selfed offspring, and all the plants of the F_1 and F_2 generations had armadillo seeds. We have previously shown (*K.B.* 1928, 17) that in interspecific hybrids (involving *S. vulgaris* and *S. maritima*) the armadillo testa is recessive to the tubercled. For *S. vulgaris* we have also stated (*K.B.* 1931, p. 352) that "it seems from our work up to the present that 'armadillo' is a very clear-cut recessive character." The breeding results given in the present paper are quite in agreement with "armadillo" being also recessive within the species *S. maritima*. It should be recalled that armadillo seeds are much more frequent as a general rule in populations of *S. maritima* than in populations of *S. vulgaris* (excluding high mountain populations).

Summary.

1. An account is given of the selfing and crossing in pairs of three plants of *Silene maritima*. Two of the crosses were carried on to the F_2 generations.

2. Anthocyanin production is shown to be due genetically to the interaction of several genes. It may or may not occur in almost

any of the vegetative or floral parts. Tentative explanations are given.

3. In general terms broad calyx is dominant over narrow.
4. Definite overlapping of petal segments is dominant to their not overlapping.
5. Figures are given for segregation of plants with female flowers only.
6. Armadillo testas alone occurred in the plants considered in this paper.

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XXX.—ON THE IDENTITY OF *ACONITUM ACAULE* DIELS. H. K. AIRY-SHAW.

The purpose of this note is to clear up a certain amount of confusion in which two Chinese species of *Aconitum*, Sect. *Napellus* (*sens. lat.*), closely allied to *A. venatorium* Diels and *A. coriophyllum* Hand-Mzt., have been involved. It will be convenient to review the question chronologically.

In 1904, Finet and Gagnepain described as *Aconitum Napellus* var. *acaule* a very distinct plant collected by Delavay in 1884, near Tali, Yunnan. Part of this gathering exists in the Kew Herbarium. The specimen is in bud, the young buds being protected by conspicuous, large, deep bluish bracts. The leaves are remarkable for the extremely numerous, long, narrow, linear lobes, into which the principal segments are divided almost to the base. The indumentum of the inflorescence is composed of two kinds of hairs: short, dense, golden-yellow, straight, spreading, mostly glandular hairs, forming a conspicuous velvety tomentum especially on the younger parts; and equally dense, but rather shorter and finer, white, often decurved, eglandular hairs, not easily seen without careful scrutiny.

In 1909, Hector L  veill   described an *Aconitum Duclouxii* from material collected by Jean Py in 1906 near Pin-Tchouan, also in Yunnan. The type specimen in Herb. Edin. has been examined, by courtesy of the Regius Keeper, and it is found to agree perfectly with the plant described by Finet and Gagnepain. This identification has also been noted by Dr. Handel-Mazzetti on the type-sheet of *A. Duclouxii*.

In 1912, Dr. L. Diels described several new species of *Aconitum* from material collected by Forrest in Yunnan, among which were *A. venatorium* Diels and "*A. acaule* (Fin. et Gagnep. sub tit. var.) Diels." The reason for placing the latter name in quotation marks will presently appear. *A. venatorium* was stated by Diels to be near "*A. acaule*." It is certainly distinct from any previously described species. The segments of the leaves are variously divided, sometimes into few, short, broad, oblong lobes, at other times cut into

numerous narrow laciniae almost as in *A. Duclouxii*, and the indumentum of the inflorescence consists of hairs of only one type, namely the second, white, eglandular type described for *A. Duclouxii*, in this case easily visible, though more minute and closely tomentellous.

An examination of the specimens cited by Diels under his "*A. acaule*" shows that they, unfortunately, do not agree with the type specimen of Finet and Gagnepain's *A. Napellus* var. *acaule*. They are, in fact, more or less intermediate between that plant and *A. venatorium*, the glandular constituent of the indumentum agreeing with that of the former, the eglandular with that of the latter. The leaves are generally smaller and less divided than either: in any case they never approach the remarkable laciniation of var. *acaule*.

It seems clear, therefore, that Diels, when making the new combination *Aconitum acaule* (Fin. et Gagnep.) Diels for the plant of Finet and Gagnepain and applying it to Forrest's specimens, had not seen the original type (as indeed might also be inferred from the fact that he does not cite it), and that he was basing his identification solely on Finet and Gagnepain's brief description. This new combination, however, cannot be used for those authors' var. *acaule*, when raised to specific rank, since Léveillé had already independently described the same group as a species under the name *Aconitum Duclouxii*. (He probably did this in ignorance of Finet and Gagnepain's work.) Nor can the combination be employed for the plant which Diels actually described, since it was explicitly based upon *A. Napellus* var. *acaule* Fin. et Gagnep. The new name *A. Dielsianum* is therefore proposed for the species described by Diels under the name *A. acaule*.

A. Inflorescentiae indumentum heterotrichum: pili breves, recti, patentes, aurei, plerumque glandulosi, tomentum velutinum sistentes, cum pilis aliis minoribus tenuioribus decurvis albis eglandulosis intermixtis:

- (a) Foliorum segmenta primaria in lacinias lineares longas angustas numerosissimas profunde composito-pinnatifido-dissecta; flores purpurascentes.....1. *Duclouxii*
- (b) Folia in segmenta primaria 3 fere libera cuneatim divisa; segmenta lateralialia quam segmentum medium rhomboideum subduplo maiora, in duas partes subaequales usque $\frac{3}{4}$ divisa; hae partes invicem in duas partes usque $\frac{1}{2}$ divisae; omnia apice modice inciso-lobata; flores caerulescentes; indumentum brevissime tomentellum.....

2. *Dielsianum*

- (c) Folia crassissime coriacea, sicut ea *A. Dielsiani* in segmenta primaria 3 fere libera divisa, sed basi segmentorum lateralium latissime cuneata dein reniformi-flabellata, marginibus lateralibus (ipsa basi excepta) valde imbricatis vel sibi incumbentibus; lobuli ultimi lati, breves; flores viridulo-flavi.....3. *coriophyllum*

B. Inflorescentiae indumentum homotrichum : pili minuti, decurvo-adpressi, albi, eglandulosi, tomentellum brevissimum soliistentes ; folia inter ea *A. Duclouxii* et ea *A. Dielsiani* intermedia ; flores caeruleo-purpurei.....4. *venatorium*

The four species here dealt with have the following characters in common : *Leaves* few, mostly basal, very long-petiolate ; *inflorescence* leafless ; *pedicels* erect, often almost adpressed to the main stem ; *carpels* 5. A specimen in Herb. Edin. from Upper Burma (Farrer 1896), the flowers of which are stated by the collector to be " typically pale china-blue, to a deeper shade," and whose indumentum appears to consist exclusively of the golden-velvety glandular type, probably represents an undescribed species closely related to *A. Dielsianum*.

Among less closely allied species, *A. stylosum* Stapf (*A. euryanthum* Hand.-Mazz.) may be easily distinguished by its inflorescence distinctly leafy below, its spreading pedicels, and its very long styles ; *A. Souliei* Fin. et Gagnep. by its compound racemose inflorescence, the conspicuously golden-velvety flowers often being congested into false umbels at the ends of the branches. *A. transsectum* Diels (type, Forrest 2868) is separable by means of its eglandular but yellowish indumentum, and by its 3 carpels. Two other gatherings, Forrest 10845 and Forrest 11249, with 3-4 carpels, indumentum very similar to that of *A. venatorium*, and leafy stem, are possibly but doubtfully also referable to *A. transsectum*.

1. **Aconitum Duclouxii** Lèveillé in Fedde, Rep. Spec. Nov. vii. 99 (1909).—*A. Napellus* var. *acaule* Finet et Gagnepain in Bull. Soc. Bot. France, li. 512 (1904) ; Contr. Fl. As. Or. i. 209 (1905). *A. acaule* (Fin. et Gagnep.) Diels in Notes Roy. Bot. Gard. Edinb. v. 270 (1912), excl. descr. et specim. cit. *A. sp. aff. venatorium* Diels, Auctt. Edin. in Notes Roy. Bot. Gard. Edinb. xiv. 290, 328, 353 (1924).

YUNNAN. Chao-Chang, près Pin-Tchouan, Aug. 1906, Jean Py in Herb. Bonatiano no. 576 (typus in Herb. Lévl.). Les bois de chênes sur la montagne de Ki chan, alt. 2800 m., près de Tali, 10 Sept. 1884, Delavay 1209 (typus *A. Napelli* var. *acaulis* Fin. et Gagnep. ; syntypus in Herb. Kew.) : " Fl. bleues.—La racine appelée Toula est très employée comme contre poison." Margins of thickets on alpine meadows on the Chien-chuan-Mekong divide, lat. 26°30' N., long. 99°40' E., alt. 3600-3900 m., Aug. 1922, Forrest 21,985 : " Plant of 14-24 inches. Flowers immature, said to be ruddy-purple." Open rocky slopes and in thickets in side valleys on the Chien-chuan-Mekong divide, lat. 26°30' N., long. 99°40' E., alt. 3600 m., Sept. 1922, Forrest 22,327 : " Plant of 2½-3 ft. Flowers deep dull rosy-purple." On ledges of cliffs and open rocky slopes amongst scrub on the Chien-chuan-Mekong divide, lat. 26°40' N., long. 99°40' E., alt. 3900 m., Oct. 1922, Forrest 22,601 : " Plant of 2-2½ ft. Flowers dull deep bluish-purple."

2. **Aconitum Dielsianum** *Airy-Shaw*, nom. nov.—*A. acaule* Diels in Notes Roy. Bot. Gard. Edinb. v. 270, tantum quoad descr. et specim. cit. ; non *A. Napellus* var. *acaule* Fin. et Gagnep.

YUNNAN. In declivitatibus herbosis montis Ts'ang prope Tali, alt. 2500 m., 4 Oct. 1914, *Schneider* 2721 : "Flores intense caerulei." Open mountain pastureland on the Tali range to the west of Tali-fu, lat. 25°40' N., alt. 2700–3000 m., Oct. 1904, *Forrest* 280. Open grassy ledges of cliffs on the eastern flank of the Lichiang range, lat. 27°20' N., alt. 3150–3450 m., Oct. 1906, *Forrest* 3089 : "Plant of 1–2½ ft. Flowers deep clear blue." Dry ledges, and at the base of cliffs in side valleys on the eastern flank of the Tali range, lat. 25°40' N., alt. 2400–3000 m., Aug.–Oct. 1906, *Forrest* 4691 : "Plant of 1½–3 ft. Flowers deep blue." Ledges of cliffs, Tali range, lat. 25°40' N., alt. 3000–3300 m., Sept. 1910, *Forrest* 7193 : "Plant of 20–30 inches. Flowers dull blue-purple." Stony open pasture and on ledges of cliffs, side valleys on the Tali range, lat. 25°40' N., alt. 3000 m., Aug. 1913, *Forrest* 11,695 : "Plant of 2–3 ft. Flowers deep clear blue." Margins of forests and on heavy pasture, western flank of the Tali range, lat. 25°40' N., alt. 3300 m., Aug. 1917, *Forrest* 15,507 : "Plant of 2–3 ft. Flowers light purplish-blue."—Huic speciei probabiliter spectat quoque specimen sequens :—Vallées de montagnes à Lan-ngi-tsin, alt. 3000 m., Juillet, *Maire* 421/1913 (Herb. Edin.) : "Aconitum vivace en touffes dressées ; fl. bleu-violacé."

3. **Aconitum coriophyllum** *Hand.-Mazz.* in Akad. Anz. Wiss. Wien, Math.-Naturw. Kl. 1925, lxii. 220 (1926) ; reimpr. : Pl. Nov. Sin. Fortsetz. 36, 3 (1926).

YUNNAN. In regionis calide temperatae ad austro-orient. pagi Dschungdien ("Chungtien") rupestribus supra vic. Loyü ad fl. Yangdse, lat. 27°13' N., substrato schistaceo, alt. circiter 2600 m., 18 Oct. 1916, *Handel-Mazzetti* 12,994 : "Flores viridulo-flavi."

4. **Aconitum venatorium** *Diels* in Notes Roy. Bot. Gard. Edinb. v. 269 (1912).

This appears to be the most abundant species of the four. The following numbers collected by George Forrest in YUNNAN are referable to it, field notes and other data being omitted both in order to save space and also because no confusion as yet attaches to this species :—

Forrest 826, 883, 1101, 9222, 9300, 25,218, 25,316, 27,390, 27,440.

The following specimens from the adjacent territory of NORTH-EAST UPPER BURMA also appear to belong to this species :—

Forrest 27,550 ; *Farrer* 1310 (Hpimaw Pass, opener places and glades and pathsides in the upper alpine woodland, abundant, alt. 3000–3150 m., 16 Sept. 1919 : "Flowers of dark musty purple") ; *Farrer* 1376 (Luksang Bum, occasional, in open places, near the top of the mountain, alt. 2550 m., 5 Oct. 1919 : "Flowers bright purple, but may= F[arrer]. 1310").

A form occurs in which the petals lack the typical gibbous backwardly directed sac or spur: this may be distinguished as—

var. **ecalcaratum** *Airy-Shaw*, var. nov. petalis plus minus rectis haud vel vix uncinato-calcaratis.

YUNNAN. Sine loc. spec., Sept. 1917, *Forrest* 16024 ("duplicate of 1905"). Margins of thickets and by streams, N'Maikha-Salwin divide, lat. 25°50' N., alt. 2100–2400 m., Sept. 1919, *Forrest* 18,478: "Plant of 2–2½ ft. Flowers purplish-blue." Margins of woodland in side valleys, Shweli-Salwin divide, lat. 25°30' N., long. 98°58' E., alt. 3000 m., Nov. 1924, *Forrest* 25,358: "Plant of 2½–4 ft. Flowers deep-blue purple." On open grassy slopes, hills north of Tengyueh, lat. 25°30' N., long. 98°30' E., 2400–2700 m., Oct. 1924, *Forrest* 25,996: "Plant of 3–4 ft. Flowers deep purplish-blue."

NORTH-EAST UPPER BURMA. On stony alpine meadows, western flank of the N'Maikha-Salwin divide, lat. 26°45' N., long. 98°48' E., alt. 4200 m., Oct. 1925, *Forrest* 27,444: "Plant of 3 ft. Flowers dull purplish-blue."

The writer desires to express once again his gratitude to Professor W. Wright Smith for the loan of copious material from the Edinburgh Herbarium.

XXXI.—NEW OR LITTLE KNOWN PLANTS FROM SOUTH INDIA. I.

Hopea Jacobi *C. E. C. Fischer*, sp. nov. [Dipterocarpaceae]; *H. jucundae* Thw. et maxime var. *modestae* A. DC. affinis, ab utraque foliorum nervis secundariis numerosioribus, tertiariis irregularibus, axillis nervorum eglanduliferis, petalis minute puberulis nec sericeis, strictura inter ovarium et stylopodium manifestata, distinguenda.

A tree, quite glabrous except the petals. Ultimate twigs slender, dark-brown, almost black when dry. Leaves chartaceous, ovate, caudate-acuminate, obtuse or subacute, base rounded, 5.5–8.5 cm. long, 2.6–4 cm. wide, margins entire, subundulate, midrib, 5–6 pairs of lateral nerves, the irregular tertiary nerves and the fine reticulations slightly prominent below; petioles 0.8–1 cm. long. Panicles axillary and terminal, solitary or twin, narrowly racemose, shorter than the leaves; rhachis and its branches filiform; bracts minute. Flowers secund, up to 7 on a branch; pedicels very short, rather stout, enlarged upwards. Sepals coriaceous, the inner with thin margins, subcircular, 1.5 mm. long. Petals oblong, obtuse, 3.25 mm. long, minutely ciliate and minutely puberulous without. Stamens 15; filaments 0.7 mm. long, the lower half dilated and abruptly narrowed into a filiform upper half; anthers circular, flat, 0.3 mm. diam. with a fine, straight arista 2½–3 times as long. Ovary subglobose, with a narrower ovoid stylopodium nearly as long, slightly constricted between the two, together 1.25 mm. long; style very short. Fruit not seen.

Coorg, *K. Cherian Jacob* 16903.

***Embelia adnata* Bedd.** apud C. B. Clarke [Myrsinaceae].

Known from a single sheet in the Kew Herbarium, collected by R. H. Beddome in the Bolampatti Hills near Coimbatore.

High Wavy Mountains, Sept., K. C. Jacob in Madras Herbarium 77056.

Beddome's specimen is in flower and the fruit was unknown. Its leaves are rather larger than those of Jacob's specimen and are nearly always acute; the High Wavy Mountain specimens have leaves rounded or slightly emarginate at the apex and are 2.7–7.5 cm. long, 1.1–3.5 cm. wide. The fruit are globose, 2–2.5 mm. diam., gland-dotted, usually with persistent style.

***Eriochrysis Rangacharii* C. E. C. Fischer**, sp. nov. [Gramineae-Andropogoneae]; *E. purpuratae* Stapf affinis, sed internodio supremo villosa, racemorum pedicellorumque nodis hirsutis, glumis enerviis, gluma superiore carinata, omnibus spiculis staminiferis differt.

Tufted perennial herb. Culms erect, 12–30 cm. long, 3-noded, upper node not or shortly exserted, nodes softly villous with spreading white hairs; lower internodes usually glabrous, sometimes sparsely short-hairy; uppermost node increasingly white-villous upwards, densely so just below the panicle. Leaf-sheaths rather tight, sulcate, glabrous below, increasingly white-villous upwards; ligules short, rounded, rigidly chartaceous, shortly ciliate; blades very narrow, rigid, involute below, plicate or more or less flat with involute margins above, acuminate, those from the innovations up to 21 cm. long and 5 mm. wide, the upper much shorter and narrower, uppermost sometimes only 3.5 cm. long, softly white-villous on both faces, secondary nerves several, varying with the width of the leaf. Panicle narrow, 3.5–6.5 cm. long, rather dense; racemes 3–4, sessile, up to 3 cm. long; joints at the base 2.5 mm. long. Sessile spikelet narrowly lanceolate, 5.5–6.2 mm. long, surrounded by rufous hairs up to 2.2 mm. long; lower glume the shape and length of the spikelet, firmly chartaceous, back flat, margins involute and clothed with rufous hairs at least in the upper part, rest glabrous, nerves obsolete or one faint one in each margin; upper glume nearly as long as the lower, rather thinner in texture, boat-shaped, distinctly keeled, acuminate, margins narrowly involute and hairy at least in upper half, keel bearing a few cilia, rest glabrous; lower lemma hyaline, oblong or lanceolate, obtuse or acute, flat, margins very narrowly involute, softly white-hairy, 4–4.3 mm. long, without palea and empty; upper lemma thinly hyaline, linear or lanceolate, more or less concave, subacute, 2–2.3 mm. long, with an apical tuft of hairs $\frac{1}{4}$ – $\frac{1}{2}$ its length; without palea; lodicules 2, minute, obcuneate, or quadrate-obcuneate, apical margin denticulate, the outer angle produced; stamens 3, filaments short, anthers linear, 2.7 mm. long, apex shortly acutely 2-lobed, base deeply 2-lobed, reddish-brown; styles 2, distinct, stigmas long-plumose. Pedicelled spikelet narrowly

lanceolate, acute, 4-4.5 mm. long, densely surrounded by rufous hairs up to 2.2 mm. long; lower glume the shape and length of the spikelet, thinly chartaceous, flat or slightly concave, margins involute and clothed with rufous hairs, the rest glabrous; nerves obsolete or a faint one at each margin; upper glume nearly as long as the lower, thinly chartaceous, boat-shaped, keeled, acute or acuminate, margins narrowly involute and clothed with rufous hairs, with a few hairs on the keel and on the sides near the apex or all over the upper $\frac{2}{3}$; lower lemma hyaline, lanceolate or oblong, acute or obtuse, 3-4.2 mm. long, softly hairy, margins narrowly involute, without palea and empty; upper lemma thinly hyaline, lanceolate or ensiform, more or less boat-shaped and keeled, 1.5-2 mm. long, with an apical tuft of white hairs about $\frac{1}{3}$ its length, without palea. *Lodicules*, *stamens* and *pistil* as in the sessile spikelet. *Grain* not seen.

Nilgiri Hills, at Pykara, about 6000 ft., June 1900, *Sir A. G. and Lady Bourne* without number (Herb. Kew.). Sir Alfred Bourne informs me that the plants were found and passed on to him by Rai Bahadur K. Ranga Achariyar.

Isachne setosa C. E. C. Fischer, sp. nov. [Gramineae-Paniceae]; *I. Lisboa* Hook. f. affinis, glumis caudato-acuminatis, lemmate superiore quam inferiore multo breviora cum palea sua dorso pubescente differt.

Tufted annual *herb.* Stem slender, 3-13 cm. high, glabrous, angular, branched. *Leaves* cauline; sheaths loose, ribbed, more or less densely clothed with spreading hairs from tubercular bases, ciliate; ligule represented by a row of hairs; blade ovate to ovate-lanceolate, acute, base rounded, 1-2.8 cm. long, 0.4-1 cm. wide, many-ribbed, glabrous to rather densely set with hairs from tubercular bases, margins narrowly cartilaginous and minutely scabrid. *Panicle* up to 5 cm. long, of a few alternate, simple or forked racemes up to 1.5 cm. long; rhachis and branches trigonous, glabrous. *Spikelets* 2-5 to a branch, elliptic, but soon gaping; pedicels short or long, angled, glabrous. *Glumes* rigid, ovate, concave, caudate-acuminate, obtuse, 2-3 mm. long, the lower usually slightly the longer, 7-nerved, more or less setose from large tubercular bases. *Lemmas* dissimilar; the lower thinly membranous, elliptic, boat-shaped, subacute, 2-2.2 mm. long, nerves obscure, its palea as long, with incurved margins, containing 3 stamens, anthers linear, 1.7 mm. long; the upper lemma very shortly stipitate, crustaceous, broadly ovate to subcircular, deeply concave, 1-1.4 mm. long, densely pubescent, its palea flat with broad inflexed flaps, pubescent on the back, containing the ovary with two free styles (no trace of stamens seen). *Lodicules* very minute. *Seed* plano-convex, filling the hardened lemma and palea.

Cochin, at Kavalai, 3000-4000 ft., *A. Meebold* 12,125 (type); Travancore, at Devicolam; 6000 ft., *A. Meebold* 13,586. Both sheets in the Breslau Herbarium.

XXXII.—ON THE FLORA OF THE NEARER EAST : XII.*
DR. GIUSEPPI'S 1931 COLLECTION FROM EUBOEA AND OTHER PARTS
OF GREECE. W. B. TURRILL.

In the summer of 1931 Dr. P. L. Giuseppi made an extensive trip through parts of Crete and Greece. His main object was the collecting of living plants for horticultural purposes, but he made an interesting collection of dried specimens, which he has presented to the Herbarium of the Royal Botanic Gardens, Kew. Since our knowledge of plant distribution in Greece is still far from complete the following list, which includes a few plants from earlier collections of Dr. Giuseppi, appears worth publishing. The majority of the plants in this collection come from the Mt. Dirphys (Delphi) region near the centre of the island of Euboea. Euboea has been visited by several botanical travellers, including Sibthorp, Unger, Fraas, Aucher-Eloy, Heldreich, Pichler, and Tuckett. Unger (Wissenschaftliche Ergebnisse einer Reise in Griechenland, 68-90, Wien, 1862) gives an outline account of the vegetation of the central part of the island. Dr. Giuseppi has, however, added several records to those already known and it is evident that Euboea is worthy of a more detailed botanical survey than has yet been made of it.

Viola delphinantha Boiss. Thessaly : Mt. Olympus, 1840 m., 26.6.29, on cliffs in clefts in rocks, flowers scented, No. 56 ; Mt. Olympus, below the plain of Bara, on rock cliffs, 1840-1990 m., 12.7.31, No. 45.

V. heterophylla Bert. subsp. *euboea* (Hal.) W. Becker. Euboea : Mt. Dirphys, 2.7.31, No. 22B.

V. saxatilis Schmidt subsp. *aetolica* W. Becker var. *heterosepala* W. Becker. Euboea : Mt. Dirphys, 1230 m., 2.7.31, No. 23.

Cerastium candidissimum Correns. Euboea : Mt. Dirphys, 2.7.31, No. 22A.

Dianthus haematocalyx Boiss. et Heldr. Thessaly : Mt. Olympus, just below the plain of Bara, on screes, 1990-2150 m., 12.7.31, No. 46.

D. viscidus Chaub. et Bory. Euboea : Mt. Dirphys, 610-1550 m. 2.7.31, Nos. 12, 14. The specimens under the second number have glandular-puberulous calyces, but the calycine scales are definitely inflated and it has not, therefore, been named var. *Grisebachii* Boiss.

Drypis spinosa L. Euboea : Mt. Dirphys, 2.7.31, No. 20A.

Gypsophila polygonoides Hal. Euboea : Mt. Dirphys, on mountain cliffs, 610-760 m., 2.7.31, Nos. 7, 11.

Lychnis Coronaria (L.) Desv. Euboea : Mt. Dirphys, 610 m., 2.7.31, No. 36.

Hypericum delphicum Boiss. et Heldr. Euboea : Mt. Dirphys, 1550 m., 2.7.31, No. 35.

H. fragile Heldr. et Sart. Euboea : Mt. Dirphys, mountain cliffs, 760 m., 2.7.31, No. 10.

*Continued from *Kew Bull.* 1932, 198.

- H. olympicum* L. Euboea : Mt. Dirphys, 920 m., 2.7.31, No. 34. Approaching the var. *minus* Chaub. et Bory.
- Geranium brutium* Gasp. (*G. villosum* Ten.?). Euboea : Mt. Dirphys, 2.7.31, No. 26A.
- G. lucidum* L. Euboea : Mt. Dirphys, 760 m., 2.7.31, No. 22.
- G. macrorrhizum* L. Euboea : Mt. Dirphys, 1230 m., 2.7.31, No. 30.
- G. subcaulescens* L'Hér. Mt. Parnassus, 1840–2150 m., 7.7.31, on screes, flowers bright red with no black centre, No. 41.
- Acer monspessulanum* L. Crete : Nida Plain, 1230 m., 19.6.31, No. 6.
- Anthyllis vulneraria* L. var. *Spruneri* Boiss. Euboea : Mt. Dirphys, 2.7.31, No. 28A.
- Astragalus rumelicus* Bunge. Euboea : Mt. Dirphys, 2.7.31, No. 25.
- Orobis hirsutus* L. Euboea : Mt. Dirphys, 2.7.31, No. 23A.
- Potentilla speciosa* Willd. var. *discolor* Hal. Euboea : Mt. Dirphys, 2.7.31, No. 15.
- Saxifraga sardica* Griseb. Euboea : Mt. Dirphys, 2.7.31, No. 21 ; Ziria Mtns., 2000 m., 6.6.31, only found in one locality and very few plants alive, No. 1 (var. *erythrantha* Hal., with purple petals).
- Pyrus* (*Sorbus*) *Aria* Ehrh. var. *cretica* Lindl. Euboea : Mt. Dirphys, 610 m., 2.7.31, No. 17.
- Sedum album* L. Euboea : Mt. Dirphys, 610 m., 2.7.31, No. 31 (probably the var. *brevifolium* Boiss. = *S. athoum* DC.).
- S. hispanicum* W. et K. Euboea : Mt. Dirphys, 2.7.31, No. 20B.
- Carum meoides* Hal. Euboea : Mt. Dirphys, 920 m., 2.7.31, No. 26.
- Asperula arcadiensis* Sims. Chelmos Mtns., 1700 m., on rocks, 5.6.31, No. 2.
- Galium Mollugo* L. (sensu Halácsy). Euboea : Mt. Dirphys, 760 m., 2.7.31, No. 27.
- Valeriana tuberosa* L. Ziria Mtns., 1380–1700 m., 6.6.31, flowers have a delightful odour, No. 3.
- Pteroccephalus perennis* Coult. Euboea : Mt. Dirphys, 1380 m., on cliffs, 2.7.31, No. 24.
- Chamaepeuce mutica* DC. Euboea : Mt. Dirphys, 610 m., 2.7.31, mountain sides, No. 9.
- Crepis incana* S. et S. Euboea : Mt. Dirphys, 1550 m., 2.7.31, Nos. 26B, 29.
- Campanula Aizoon* Boiss. et Sprun. Mt. Parnassus, 1380 m., cliffs, 7.7.31, No. 40.
- C. oreadam* Boiss. et Heldr. Thessaly : Mt. Olympus, just below the summits Mitka and Stepham, 2460–2920 m., and also below the plain of Bara, cracks in cliffs, 12.7.31, No. 46A.
- C. parnassica* Boiss. et Sprun. Mt. Parnassus, on screes, 1900 m., 7.7.31, No. 42.

C. rupestris S. et S. Euboea : Mt. Dirphys, 610 m., mountain sides, 2.7.31, No. 8.

C. rupicola Boiss. et Sprun. (forma glabrescens). Mt. Parnassus, cliffs and screes, 1840-2300 m., 7.7.31, No. 43.

C. saxatilis L. Crete : Pervolitzza, 610 m., 9.6.31, No. 5.

C. Sibthorpiana Hal. Euboea : Mt. Dirphys, 610-760 m., on screes, 2.7.31, No. 18.

Diosphaera dubia Buser. Thessaly : Mt. Olympus, 1080 m., cracks in cliffs, 12.7.31, No. 47.

Lycopsis variegata L. Euboea : Mt. Dirphys, 1230 m., 2.7.31, No. 19.

Orobanche nana Noë. Euboea : Mt. Dirphys, 1230 m., 2.7.31, No. 28.

Vitex Agnus-castus L. Lake Copais, 610 m., sides of ditches, 8.7.31, No. 39.

Ajuga genevensis L. Euboea : Mt. Dirphys, 920-1230 m., 2.7.31, No. 21A.

Amaracus pulchra Briq. (*Origanum pulchrum* Boiss. et Heldr.). Euboea : Mt. Dirphys, 610 m., 2.7.31, No. 38.

Sideritis euboea Heldr. Euboea : Mt. Dirphys, 2.7.31, No. 37.

Stachys germanica L. var. *penicillata* Boiss. Euboea : Mt. Dirphys, 760 m., 2.7.31, No. 13.

Loranthus europaeus Jacq. Euboea : Mt. Dirphys, 610 m., 2.7.31, No. 33.

Castanea sativa Mill. Euboea : Mt. Dirphys, 610 m., 2.7.31, No. 32.

Fritillaria Guicciardii Heldr. et Sart. Ziria Mtns., 1780 m., loose stony soil, 6.6.31, No. 4.

Lilium chalcedonicum L. Thessaly : Mt. Olympus, 1550 m., 9.7.31, No. 44.

XXXIII.—MISCELLANEOUS NOTES.

Works on Diatomaceae available on loan.—Mr. Frederick Adams, who has been well known for many years as an enthusiastic collector of Diatomaceae, and whose collection now contains some 21,000 slides comprising over 1,000,000 diatoms, fully indexed, has recently been in communication with Kew as to the best means of ensuring that his collection will be permanently maintained, extended and made available for study. Mr. Adams has also built up a comprehensive set of the principal works on Diatoms, many in duplicate. With regard to the latter Mr. Adams wrote :—" If your regulations permit you to lend books to responsible persons, I would give you at once duplicates I have of the principal works on diatoms. They are of considerable intrinsic value and would be of the greatest service to individual workers who cannot afford to buy them, and it would give me the pleasure of knowing that they are being used." As the Kew Library is maintained primarily for workers at that institution, whose researches would be seriously interrupted by

awaiting the return of a book from loan, the regulations do not permit the borrowing of books, and it is considered undesirable to make any exception to this rule. It was felt, however, that Mr. Adams's generous offer should be accepted if possible, and the Bentham Trustees, on being approached, readily agreed to become the custodians of Mr. Adams's gift on the understanding that, though the works could not be incorporated in the Kew Library, they could be deposited there and issued at the discretion of the Director.

The books in question, of which a list is appended, have now been received at Kew, and the Director has pleasure in informing workers on *Diatomaceae*, who will no doubt greatly appreciate Mr. Adams's public spirit, that on application to him the works can be consulted at Kew or sent on loan to responsible persons on payment of carriage both ways.

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- Bailey, J. W.** Notice of some new localities of fossil and recent *Infusoria*. (Amer. Journ. Sci. xlviii.) New Haven, 1845. 8vo. 25 pp. 1 pl.
- Bailey, J. W.** Microscopical examination of soundings made by the U.S. Coast Survey off the Atlantic Coast of the U.S. (Smithsonian Contrib. ii.) Washington, 1851. 4to. 15 pp. 1 pl.
- Bailey, J. W.** Microscopical observations made in South Carolina, Georgia and Florida. (With Appendix : Microscopical forms found near Salem, Mass., by T. Cole, Esq.) (Smithsonian Contrib. ii.) Washington, 1851. 4to. 48 pp. 3 pl.
- Bailey, J. W.** Notes on new species and localities of microscopical organisms. (Smithsonian Contrib. vii.) Washington, 1854. 4to. 16 pp.
- Bailey, L. W.** Notes on new species of microscopical organisms from the Para River, South America. (Journ. Boston Soc. Nat. Hist. vii.) Cambridge, Mass., 1861. 8vo. 23 pp. 2 pls.
- Boyer, C. S.** New and rare species of *Diatomaceae*. (Contrib. Biol. & Misc. Sect. Acad. Nat. Sci. Phil. no. 1.) Philadelphia, 1922. 8vo. 9 pp. 4 pl.
- Brun, J.** Diatomées des Alpes et du Jura et de la région suisse et française des environs de Genève. Genève & Paris, 1880. 8vo.
- Brun, J.** Diatomées : espèces nouvelles marines, fossiles ou pélagiques. (Mem. Soc. de Phys. et d'Hist. Nat. Genève, xxxi.) Genève, 1891. 4to. 48 pp. 12 pl.
- Brun, J., & J. Tempère.** Diatomées fossiles du Japon. Espèces marines & nouvelles des calcaires argileux de Sendai & de Gedo. (Mém. Soc. de Phys. et d'Hist. Nat. Genève, xxx.) Genève, 1889. 4to. 75 pp. 8 pl. (3 copies).
- Carpenter, W. B.** The microscope and its revelations. Ed. 8, by the Rev. W. H. Dallinger. London, 1901. 8vo.
- Castracane, F.** Report on the *Diatomaceae* collected by H. M. S. Challenger during the years 1873-1876. London, 1886. 4to. (2 copies).

- Castracane, F.** Quale sia l'estensione della vita vegetale nelle profondità del mare. (Atti Congr. Naz. Bot. Crittog. Parma.) [Varese, 1887.] 4to. 7 pp.
- Cleve, P. T.** Diatomacéer från Spetsbergen. (Öfvers. K. Vet.-Akad. Förhandl. 1864, no. 10.) Stockholm, 1864. 8vo. 10 pp. 1 pl.
- Cleve, P. T.** Svenska och Norska Diatomacéer. (Öfvers. K. Vet.-Akad. Förhandl. 1868, no. 3.) Stockholm, 1868. 8vo. 28 pp. 1 pl.
- Cleve, P. T.** Examination of Diatoms found on the surface of the sea of Java. (Bihang K. Svenska Vet.-Akad. Handl. Bd. 1, no. 11.) Stockholm, 1873. 8vo. 13 pp. 3 pl.
- Cleve, P. T.** On Diatoms from the Arctic Sea. (Bihang K. Svenska Vet.-Akad. Handl. Bd. 1, no. 13.) Stockholm, 1873. 8vo. 28 pp. 4 pl.
- Cleve, P. T.** Diatoms from the West Indian Archipelago. (Bihang K. Svenska Vet.-Akad. Handl. Bd. 5, no. 8.) Stockholm, 1878. 8vo. 22 pp. 4 pl. (2 copies).
- Cleve, P. T.** Färskvattens-Diatomacéer från Grönland och Argentinska Republiken. (Öfvers. K. Vet.-Akad. Förhandl. 1881, no. 10.) Stockholm, 1881. 8vo. 12 pp. 1 pl.
- Cleve, P. T.** On some new and little known Diatoms. (K. Svenska Vet.-Akad. Handl. Bd. 18, no. 5.) Stockholm, 1881. 4to. 28 pp. 6 pl. (2 copies).
- Cleve, P. T.** Diatoms collected during the expedition of the Vega. (Vega-Exped. Vetenskapl. Iakttagelser, Bd. iii.) Stockholm, 1883. 8vo. 61 pp. 4 pl. (2 copies).
- Cleve, P. T.** The Diatoms of Finland. (Acta Soc. Fauna et Flora Fenn. viii, no. 2.) Helsingfors, 1891. 8vo. 68 pp. 3 pl. 1 map.
- Cleve, P. T.** Synopsis of the Naviculoid Diatoms. Pts. 1 & 2. (K. Svenska Vet.-Akad. Handl. Bd. 26, no. 2, & Bd. 27, no. 3.) Stockholm, 1894-95. 4to. Pt. 1, 194 pp. 5 pl. Pt. 2, 219 pp. 4 pl.
- Cleve, P. T.** Diatoms from Baffins Bay and Davis Strait collected by M. E. Nilsson. (Bihang K. Svenska Vet.-Akad. Handl. Bd. 22, Afd. 3, no. 4.) Stockholm, 1896. 8vo. 22 pp. 2 pl. (2 copies).
- Cleve, P. T., & A. Grunow.** Beiträge zur Kenntniss der arctischen Diatomeen. (K. Svenska Vet.-Akad. Handl. Bd. 17, no. 2.) Stockholm, 1880. 4to. 121 pp. 7 pl.
- Comère, J.** Diatomées de la Montagne Noire. (Bull. Soc. Bot. France, li.) Paris, 1904. 8vo. 8 pp.
- Deby, J.** Analysis of the diatomaceous genus *Campylodiscus*. London, 1891. 8vo.
- Diatomeentafeln** zusammengestellt [von Weissflog] für einige Freunde. 81 plates. New York [s.a.] 8vo.
- Le Diatomiste**, par J. Tempère. Vol. 1. Paris, 1890-93. 4to.
- Dippel, L.** Beiträge zur Kenntniss der in den Soolwässern von Kreuznach lebenden Diatomeen, &c. Kreuznach, 1870. 8vo. 50 pp. 3 pl.

- Donkin, A. S.** The natural history of British *Diatomaceae*. Parts 1-3. London, [1870-73.] 8vo.
- Du Rietz, G. Einar.** The fundamental units of biological taxonomy (Svensk Bot. Tidskr. Bd. 24.) Uppsala, 1930. 8vo. 86 pp.
- Elmore, C. J.** The Diatoms (*Bacillarioideae*) of Nebraska. (Nebraska Univ. Studies, xxi.) Lincoln, Nebraska, 1921. 8vo. 148 pp. 23 pl.
- Fontell, C. W.** Süsswasserdiatomeen aus Ober-Jämtland in Schweden. (Arkiv f. Bot. Bd. 14, no. 21.) Stockholm, 1917. 8vo. 68 pp. 2 pl.
- Forti, A.** Contribuzioni diatomologiche. Diagnoses Diatomacearum quarumdam fossilium italicarum. (Atti R. Ist. Veneto di Sci., lxxii, pte. 2.) Venezia, 1913. 8vo. 116 pp. 19 pl.
- Griffith, J. W., & A. Henfrey.** The micrographic dictionary: a guide to the examination and investigation of the structure and nature of microscopic objects. Ed. 4. London, 1883. 2 vols. (text and plates) in one. 8vo. (3 copies).
- Grove, E., & G. Sturt.** On a fossil marine diatomaceous deposit from Oamaru, Otago, New Zealand. Pts. 1-3 and appendix. (Journ. Quekett Micr. Club, ser. 2, ii & iii.) London, 1886-89. 8vo. 50 pp. 11 pl.
- Grunow, A.** Some critical remarks . . . on the Oamaru Diatom papers of Messrs. Grove and Sturt . . . with annotations by E. Grove. (Journ. Quekett Micr. Club, ser. 2, iii.) London, 1889. 8vo. 5 pp.
- Heribaud Joseph, Frère.** Les Diatomées fossiles d'Auvergne. 1^{er} (-3^{me}) mémoire. Clermont-Ferrand & Paris, 1902-08. la. 8vo.
- Hustedt, F.** Die Bacillariaceen-Vegetation des Sarekgebirges. (Naturwiss. Untersuch. des Sarekgebirges in Schwed.-Lappland, geleitet von A. Hamberg. Bd. iii, Lfg. 6.) Stockholm, 1924. 8vo. 102 pp. 6 pl.
- Lemmermann, E.** *Bacillariales*, 1907. (References to literature. Reprint from Just's Bot. Jahresber. xxxv, 2 Abt.) Leipzig, 1910. 8vo. 24 pp.
- Lozano, E. D.** Depositos diatomiferos en el Valle de Toxi, Ixtlahuaca, Estado de Mexico. (An. Inst. Geol. Mexico, no. 9.) Mexico, 1920. 8vo. 19 pp. 5 pl.
- Mainland, Miss A. M.** Complete index to the articles on, and references to the *Diatomaceae* in the Transactions and Journals of the Royal Microscopical Society, 1853-1915, including subject index and indices to authors, etc. London, 1928. 8vo. 42 pp.
- Mann, A.** Diatoms, the jewels of the plant-world. (Smithsonian Misc. Coll. xlviii.) Washington, 1905. 8vo. 9 pp.
- Mann, A.** Report on the Diatoms of the Albatross voyages in the Pacific Ocean, 1888-1904. (Contr. U.S. Nat. Herb. x, pt. 5.) Washington, 1907. 8vo. 199 pp. 11 pl. (2 copies).
- Mann, A.** Marine Diatoms of the Philippine Islands. (U.S. Nat. Mus. Bull. 100.) Washington, 1925. 8vo. 182 pp. 37 pl. (4 copies).
- Meister, Fr.** Die Kieselalgen der Schweiz. (Beiträge zur Kryptogamenflora der Schweiz. Bd. iv, Heft 1.) Bern, 1912. 8vo.

- Méreschkowsky, C.** Études sur l'endochrome des Diatomées. I partie. (Mém. Acad. Imp. Sci. St. Pétersb. 8, xi, no. 6.) St. Pétersbourg, 1901. 4to. 40 pp. 7 pl.
- Le Micrographie Préparateur :** journal de micrographie générale . . . publié sous la direction de M. J. Tempère. Vols. v—xiv. Paris, 1897–1906. 10 vols. (in 5.) 8vo.
- Moros, Florentino Azpeitia.** La diatomologia española en los comienzos del siglo xx. (Assoc. Españ. Progr. Ciencia. Zaragoza. Tom. iv. Secc. 3, parte 2.) Madrid, 1911. 8vo.
- Okamura, K.** Some littoral Diatoms of Japan, &c. (Rep. Imp. Fisheries Inst. Tokyo, vii.) Tokyo, 1911. 8vo. 18 pp. (Plates wanting).
- O'Meara, Eugene.** Report on the Irish *Diatomaceae*. Part 1. (Proc. R. Irish Acad. ser. 2, ii.) Dublin, 1876. 8vo. 191 pp. 8 pl. (2 copies).
- Palmer, T. Chalkley.** *Stauroneis Terryi* D. B. Ward & A new Diatom [*Navicula socialis*]. (Proc. Acad. Nat. Sci. Phil. 1910.) Philadelphia, 1910. 8vo. 8 pp. 2 pl.
- Palmer, T. Chalkley.** Concerning *Navicula socialis*. (Proc. Delaware Co. Inst. Sci. vi, no. 3.) Media, Pa., 1911. 8vo. 6 pp.
- Pantocsek, Josef.** Beiträge zur Kenntniss der fossilen Bacillarien Ungarns. 1 Theil. Marine Bacillarien. Nagy-Tapolscány, 1886. 8vo.
- Payne, F. W.** *Diatomaceae. Liostephanina* and its allies. London, 1922. 8vo. 30 pp. 4 pl.
- Pelletan, J.** Les Diatomées : histoire naturelle, préparation, classification & description des principales espèces. Paris, 1888. 8vo.
- Peragallo, H.** Monographie au genre *Pleurosigma* et des genres alliés. (Le Diatomiste, 1890–91.) Paris. 4to. Text only.
- Peragallo, H. & M.** Diatomées marines de France et des districts maritimes voisins. Texte & Atlas. Grez-sur-Loing, 1897–1908. 2 vols. la. 8vo.
- Pritchard, Andrew.** A history of *Infusoria* including the *Desmidiaceae* and *Diatomaceae*, British and foreign. Ed. 4. London, 1861. 8vo. (2 copies).
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- Ratray, J.** A revision of the genus *Actinocyclus* Ehrb. (Journ. Quekett Micr. Club, ser. 2, iv.) London, 1890. 8vo. 76 pp. 1 pl.
- Ries, H.** Microscopic organisms in the clays of New York State. (Trans. New York Acad. Sci. xiii.) New York, 1894. 8vo. 5 pp. 2 pl.
- Schmidt, A.** Atlas der Diatomaceen-Kunde. Heft 1–79, Tafel 1–316 (=Serie i–vii) & Vorläufige Erläuterungen. Leipzig,

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- Schmidt, A.** Atlas der Diatomaceen-Kunde. Reproduction, with about half the linear dimensions of the original, by C. H. Kain, Camden, N.J., U.S.A., 1884. 80 plates, with text. 8vo. Bound with this is—Die in den Grundproben der Nordseefahrt . . . Diatomaceen, bearbeitet von A. Schmidt. (II. Jahresber. Komm. Untersuch. d. deutschen Meere in Kiel.) Berlin, 1874. 8vo.
- Smith, W.** A synopsis of the British *Diatomaceae*. London, 1853-56. 2 vols. 8vo. (3 copies).
- Taylor, F. B.** Diatoms.—New genera and species. (Trans. Amer. Micr. Soc. xxxviii.) Menash, Wis., 1919. 8vo. 8 pp. (4 copies).
- Taylor, F. B.** Notes on Diatoms. An introduction to the study of the *Diatomaceae*. Bournemouth, 1929. 8vo.
- Tempère, J., & H. Peragallo.** Diatomées du monde entier. Collection Tempère et Peragallo. Ed. 2. [s.l.] 1907. 8vo.
- Transactions and Proceedings of the New Zealand Institute.** Vol. xxi. 1888. Wellington, 1889. 8vo. Includes: Further notes on the *Desmidiæ* of New Zealand, with descriptions of new species, by W. M. Maskell (pp. 3-32); On the fossil marine diatomaceous deposit near Oamura, by H. A. de Lautour (pp. 293-311).
- Truan y Luard, A.** Ensayo sobre la sinopsis de las Diatomeas de Asturias. Parte 2. (An Soc. Esp. Hist. Nat. xiv.) Madrid, 1885. 8vo. 16 pp. 4 pl. (2 copies).
- Truan y Luard, A., & O. N. Witt.** Die Diatomaceen der Polycystinenkreide von Jérémie in Hayti, Westindien. Berlin, 1888. 4to.
- Van Heurck, H.** Synopsis des Diatomées de Belgique. Texte & Atlas. Anvers, 1880-81. 2 vols. la. 8vo. (2 copies).—Table alphabétique des noms . . . contenus dans l'Atlas. Anvers, 1884. la. 8vo. (2 copies).
- Van Heurck, H.** A treatise on the *Diatomaceae*, &c. Translated by Wynne E. Baxter. London, 1896. la. 8vo.
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